SOCIAL SCIENCES

Industrial Hygiene Section

INDUSTRIAL MEDICINE

The Journal of Occupational Diseases and Traumatic Surgery

April, 1942

The Occupational Disease Hazard
— Evaluation in the Field —

Hypertension
— In Workers over Forty Years of Age —

The Cardiovascular System
— Relationship between Injuries and Diseases —

Cod Liver Oil Ointment in Surgery
— An Eight-Year Study —

Occupational and Compensable Diseases
— With Special Reference to Tuberculosis —

Fractured Metatarsals
— Simple Treatment —

Occupational Diseases
— Bones and Joints —

Industry Goes Collegian
— Education in Evansville —

Dermatitis Control
— In a Mass Production Industry —

Who's Who in Industrial Medicine
—Individualist —

Dental Services in Industry
— Observations on Their Effects in Reducing Absenteeism —

Volume 11 Number 4

The TIME Factor in Burns

NOV. 30

Diagnosis:

Second degree burn of dorsum of hand, with slight third degree involvement.

Treatment:

Cleansing and dressings with White's Vitamin A and D Ointment.

DEC. 10

Result:

Healing without infection. Complete restoration of function. Both color photographs are unretouched.

WITH time at a premium during these days of pressure, the period of recovery from burns and wounds is important.

When you use White's Vitamin A and D Ointment in the treatment of burns and other slow-healing lesions, you will be impressed with the rapidity of healing.

This method of therapy encourages rapid, healthy granulation and epithelial repair. It avoids the contractures of coagulant therapy.

The absence of secondary infection which aids more rapid return of function, is one of the usually noted features of treatment with White's Vitamin A and D Ointment.

WHITE'S VITAMIN A & D OINTMENT

contains Vitamin A and D, derived from fish liver oils, in a suitable excipient. It is a pharmaceutically elegant compound, possessing a lasting pleasing odor—remains stable and does not develop rancidity.

Supplied in four convenient sizes: 1.5 oz. tubes, 8 oz. and 16 oz. jars, 5 lb. containers.

Our Medical Director will be glad to receive your inquiry concerning any phase of the use of this product. Write White Laboratories, Inc., 113 No. 13th Street, Newark, N.J.

Today's necessity for reducing lost man-hours and increasing employee well-being emphasizes again the importance of suitable vitamin regimens for many industrial workers. White Laboratories occupies an enviable position in the Vitamin field.

Our extensive line of Vitamin Preparations makes possible a procedure suited to individual needs. We invite consultation on the possibilities of such a program.

ERTRON
Reg. U.S. Pat. Off.

PRICES REDUCED

Your acceptance of ERTRON, doctor, together with the improved production facilities in our new laboratories, enables us to announce to the medical profession a reduction of ONE-THIRD in the price of ERTRON.

More doctors than ever before are effectively treating arthritis with ERTRON. This increased volume has made possible economies in our operating costs. We are passing these savings on to your patients as another contribution from our laboratories to the crusade against the ravages of arthritis.

The new retail prescription price of ERTRON, effective immediately, is:

BOTTLES OF 100 $8.00 BOTTLES OF 50 $4.50

ERTRON is made only in the distinctive two-color, hard gelatin capsule.

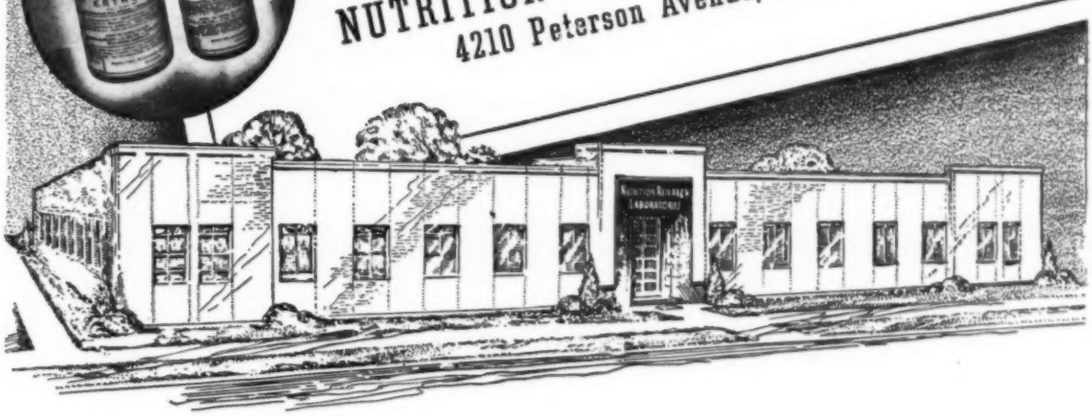
ERTRONIZE THE ARTHRITIC

Of the many therapeutic measures which have been advanced for the treatment of arthritis, ERTRON stands out for its proven safety and effectiveness.

An outline of suggested dosage and administration is available on request.

Products of Nutrition Research Laboratories are promoted only through the medical profession.

NUTRITION RESEARCH LABORATORIES
4210 Peterson Avenue, Chicago, Illinois



Compare

BARD-PARKER FORMALDEHYDE GERMICIDE

with any solution commonly used for the disinfection of surgical instruments...

1 AN EFFICIENT GERMICIDE

VEGETATIVE Test interval (minutes) producing sterility					SPORE Test interval (hours) producing sterility				
Test organism	PUS		BLOOD		Test organism	PUS		BLOOD	
	wet	dry	wet	dry		wet	dry	wet	dry
Staph. aureus	½	½	½	2	B. anthrasis	¼	¼	1	1
Strept. hemolyticus	½	½	½	*	Cl. tetani	18	18	18	18
Pseudomonas pyocyanea	½	½	½	1	Cl. welchii	1	2	4	4

*Controls negative—did not resist drying

2 CONSERVES THE BUDGETED DOLLAR

When used as directed, the Solution will not rust, corrode or otherwise damage steel instruments, glass or heat-treated rubber.

The Solution is non-injurious to the keen cutting edges of surgical knives and scissors, and delicate surgical instruments . . . thus serving to safeguard the surgeon's and hospital's instrument investment.

The Solution retains its high germicidal effectiveness over long periods of use if kept undiluted and free of foreign matter.

Ask your dealer

PARKER, WHITE & HEYL, INC.
DANBURY, CONNECTICUT

A BARD-PARKER PRODUCT

MEDICINE SURGERY

OCCUPATIONAL DISEASES
TRAUMATIC, INDUSTRIAL

INDUSTRIAL MEDICINE
& RAILROAD SURGERY

Industrial Medicine | Volume 11 | APRIL, 1942 | Number 4 | Industrial Medicine

This Month

HYPERTENSION ....*Arthur M. Master, M.D., and Simon Dack, M.D.* 140
—In Workers over Forty Years of Age
OCCUPATIONAL and Compensable Disease...*Leopold Brahdy, M.D.* 147
—With Special Reference to Tuberculosis
THE CARDIOVASCULAR System .....*J. Hamilton Crawford, M.D.* 150
—Relationship between Injuries and Diseases
COD LIVER Oil Ointment in Surgery .....*R. H. Aldrich, M.D.* 153
—An Eight Year Study
FRACTURED Metatarsals .....*Urban E. Gebhard, M.D.* 157
—Simple Treatment
DENTAL SERVICES in Industry .....*Harold A. Hooper, D.D.S.* 157
—Their Effects in Reduction of Absenteeism
INDUSTRY Goes Collegian .....*G. Malcolm Baird* 162
—Education in Evansville
NATIONAL Safety Council's Staff Health Programs 163
—Health Begins at Home
OCCUPATIONAL Diseases .....*Ludwig Teleky* 164
—Bones and Joints
WHO'S WHO in Industrial Medicine 170
—Individualist
AMERICAN Association of Industrial Physicians & Surgeons:
—Twenty-Seventh Annual Meeting 174
EDITORIAL: Interpretation of the Patch Test.....*Oscar L. Levin, M.D.* 177
INDUSTRIAL Health and Disease:
PHYSICAL Examinations in Industry.....*E. V. Goltz, M.D.* 180
(In "Minnesota Medicine")
THE FUTURE of Industrial Health.....*H. M. Vernon, M.D.* 182
(From "Labour Management, London")
REFERENCES on Industrial Hygiene..... 184
—In Relation to National Defense

Industrial Hygiene Section

WAR and Industrial Health Control.....*Donald E. Cummings* 184
LEAD Exposures.....*R. T. Homewood and H. J. Worsham* 185
—In the Printing Industry in Virginia
PORTABLE Field Colorimeter....*T. R. Thomas and Leslie Silverman* 187
—For Industrial Hygiene Use
IMMERSION Method.....*W. B. Wardlow* 189
—For the Rapid Approximation of Quartz in Industrial Dust
DERMATITIS Control.....*Thomas F. Mooney* 190
—In a Mass Production Industry
OCCUPATIONAL Disease Hazard.....*Warren A. Cook* 192
—Evaluation in the Field
LOCAL Section News..... 197

DRS. MASTER and DACK, in their "Hypertension in Workers Over Forty Years of Age" (page 145) arrive at certain conclusions which they say "should encourage both employer and employee." Coming from them, the conclusions are authoritative; they have established their work on a broad and firm foundation. . . . DR. BRAHDY, in his "Occupational and Compensable Diseases" (page 147), says physicians are often surprised to learn "that the law answers no medical questions." He goes on, to excellent effect, with some more things which, if a good many physicians are not surprised to learn, they at least have not too well remembered. . . . DR. CRAWFORD discusses "The Cardiovascular System" (page 150), developing the relationship between injuries and diseases. . . . DR. ALDRICH offers an eight-year study of "Cod Liver Oil Ointment in Surgery" (page 153). Johns Hopkins, 1929, and member of the surgical faculty, Harvard Medical School, he has to his credit the introduction of both the gentian-violet and the triple-dye burn treatments. He is on the staff of Boston City Hospital, which probably sees more burns than any other hospital in the United States. . . . DR. GEBHARD (page 157), in the midst of the emphasis on prevention, attacks the problem of disabilities among war workers from the curative side, and makes an ingenious contribution to quick recovery. Interestingly enough, Standard Oil's *Medical Bulletin*, February, 1942, has a description of a similar adaptation by DRS. I. L. GEORGE and CHARLES E.

INDUSTRIAL MEDICINE, The Journal of Occupational Diseases and Traumatic Surgery. Entered as second class mail matter August 28, 1941, at the Post Office at Chicago, Illinois, under the Act of March 3, 1879. Published on the fifth of each month by INDUSTRIAL MEDICINE PUBLISHING COMPANY, Chicago. STEPHEN G. HALOS, President; A. G. PARK, Vice-President; A. D. CLOUD, Managing Editor; HOLLIE EISHER, Secretary; CHARLES DRUECK, JR., Treasurer; STEPHEN G. HALOS, Advertising and Business Manager. PUBLICATION, EDITORIAL and EXECUTIVE Offices: 540 No. Michigan Ave., Chicago, Illinois. Subscription $5.00 per year in the United States; $5.50 per year in Canada; $6.00 per year in other countries. Single copies 50 cents. Title Registered in U.S. Pat. Off.

Copyright, 1942, by Industrial Medicine Publishing Co.

INDUSTRIAL MEDICAL and RAILWAY SURGICAL ASSOCIATIONS

Officers; Directors; Committees; Meetings

Industrial Medicine
Reg. U. S. Pat. Off.
Official Publication
American Association of Industrial Physicians and Surgeons

THE object of this Association shall be to foster the study and discussion of the problems peculiar to the practice of industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes and results of the medical care of employees, and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for their mutual advancement in the practice of their profession.

Officers

President
T. LYLE HAZLETT, M. D.
Westinghouse Electric and Mfg. Co.,
Pittsburgh, Pennsylvania

President-Elect
JOHN J. WITTMER, M.D.
Consolidated Edison Company of New York, New York, N. Y.

First Vice-President
JOHN J. PRENDERGAST, M.D.
Chrysler Motor Corporation,
Detroit, Michigan

Second Vice-President
HARVEY BARTLE, M.D.
Pennsylvania Railroad,
Philadelphia, Pennsylvania

Managing Director
EDWARD C. HOLMBLAD, M.D.
Railway Express Agency
28 East Jackson Boulevard
Chicago, Illinois

Convention Manager
ARMOUR G. PARK,
540 North Michigan Ave.
Chicago, Illinois

Directors 1940-1942

McIVER WOODY, M.D.
Standard Oil Co. of New Jersey
New York, N. Y.

LLOYD NOLAND, M.D.
Tennessee Coal & Iron Co.
Fairfield, Alabama

CAREY P. McCORD, M.D.
Industrial Health Conservancy
Laboratories, Detroit, Michigan

FREDERICK W. SLOBE, M.D.
Automatic Electric Company
Chicago, Illinois

HAROLD A. VONACHEN, M.D.
Caterpillar Tractor Company,
Peoria, Illinois

MELVIN N. NEWQUIST, M.D.
The Texas Company
New York, N. Y.

Directors 1941-1943

DANIEL L. LYNCH, M.D.
New England Telephone & Telegraph Company, Boston, Massachusetts

WILLIAM A. SAWYER, M.D.
Eastman Kodak Company,
Rochester, New York

LOYAL A. SHOUDY, M.D.
Bethlehem Steel Company
Bethlehem, Pennsylvania

CLARENCE D. SELBY, M.D.
General Motors Corporation
Detroit, Michigan

ADVERTISERS

Aciform Corporation 12
Aciform II
Alkalol Company, The..... 180
Alkalol
Aloe, A. S., Company..... 10, 175
"All Purpose" Industrial Dressing Chair
American Optical Company..... 3rd Cover
AO Filterweld Welding Plates
Becton, Dickinson & Co..... 16
B-D Sterling Silver Cannulae
Cambridge Instrument Co., Inc..... 20
All Electric Electrocardiograph
Ciba Pharmaceutical Products, Inc. 4th Cover
Biotose
Effervescent Products, Inc..... 178
Clinitest
General Electric X-Ray Corporation..... 26
G-E Inductotherm
Hospital Equipment Corporation..... 20
Medical Department Equipment
Hynson, Westcott & Dunning, Inc..... 182
Mercurochrome
Iodocholeate Products Corporation..... 4
Iodolate (Iodocholeate)
Keystone View Company..... 175
Keystone Industrial Visual Safety Tests
Leeming, Thomas, & Co., Inc..... 18
Calmitol
Lepel High Frequency Laboratories, Inc... 181
Short Wave Therapy
Lientz, E. C., & Co., Inc..... 23
Hydrosulphosol
McNeil Laboratories 11
Jelly Dymixal
Milburn Company, The..... 181
Ply
Morton Salt Co..... 179
Morton's Salt Tablets
Nutrition Research Laboratories..... 1, 25
Ertron; Pendron
Packwood, G. H., Mfg. Co..... 6
Pax
Parker, White & Heyl, Inc..... 2
Bard-Parker Formaldehyde Germicide
Patch, The E. L. Company..... 24
Gadoment
Patterson Screen Co., The..... 14
Patterson X-Ray Screens
Pelton & Crane, The, Co..... 22
Pelton Localite
Reynolds, R. J., Tobacco Company..... 13
Camel Cigarettes
Searle, G. D., & Co..... 7
Furmerane
Sharp & Dohme..... 17
"Lyovac," Normal Human Plasma
Squibb, E. R., & Sons..... 15
Squibb Hematinics and Liver Extract
Thomas, Charles C., Publisher..... 183
"The Injured Back and Its Treatment"
Vital Foods Corporation..... 180
Vitamight
Warner, William R., & Co., Inc..... 21
Lixa-Beta
West Disinfecting Company..... 9
Lan-O-Kleen; Wescol; West Protective Creams
Westinghouse Electric & Manufacturing Company 5
Pandex
White Laboratories, Inc..... 2nd Cover
White's Vitamin A & D Ointment
Wilmot Castle Company..... 19
Sterilizers; Lights
Wyeth, John & Brother, Inc..... 182
Wyanoids

Industrial Medicine
Reg. U. S. Pat. Off.
Official Publication
American Association of Industrial Physicians and Surgeons

RICHARD E. NEWBERRY, M.D.
President, Georgia Association of Industrial Physicians and Surgeons
Atlanta, Georgia

FRANK T. McCORMICK, M.D.
Detroit Industries, Detroit, Michigan

Committees

1942 Annual Meeting—Cincinnati
ROBERT A. KEHOE, M.D., General Chairman

National Defense
DANIEL L. LYNCH, M.D., Chairman
HENRY S. BROWN, M.D.
D. O. HAMBLIN, M.D.
CHARLES-FRANCIS LONG, M.D.

Component Societies
A. H. WHITTAKER, M.D., Chairman
RICHARD E. NEWBERRY, M.D.
RALPH CHRISTOPHER LEGGO, M.D.
WILLIS W. LASHER, M.D.
JAMES A. SIMPSON, M.D.
DON W. DEAL, M.D.

Membership
B. L. VOSBURGH, M.D., Chairman
E. A. IRVIN, M.D.
FRANK T. McCORMICK, M.D.

Publication and Editorial Policy
C. O. SAPPINGTON, M.D., Chairman
ROBERT A. KEHOE, M.D.
CLARENCE D. SELBY, M.D.

Nutrition
W. A. SAWYER, M.D., Chairman
HALSTEAD S. MURAT, M.D.
A. G. KAMMER, M.D.
H. H. FELLOWS, M.D.
FRANK PEDLEY, M.D.
F. G. BARR, M.D.

Psychiatry
LOYAL A. SHOUDY, M.D., Chairman
LYDIA G. GIBERSON, M.D.
C. F. N. SCHRAM, M.D.
CASSIUS H. WATSON, M.D.

Fatigue
J. M. CARLISLE, M. D., Chairman
M. H. HEILMAN, M.D.
MACK SHAFER, M.D.

Medical Records and Procedures
STUART F. MEEK, M.D., Chairman
CAREY P. McCORD, M.D.
B. L. VOSBURGH, M.D.
MELVIN N. NEWQUIST, M.D.

Medical Education
M. H. KRONENBERG, M.D., Chairman
F. J. WAMPLER, M.D.
SARAH I. MORRIS, M.D.

Prevention of Blindness
JOHN J. WITTMER, M.D., Chairman
N. E. ECKELBERRY, M.D.
HARRY SPAULDING, M.D.

Syphilis
CASSIUS H. WATSON, M.D., Chairman
HARVEY BARTLE, M.D.
HAROLD A. VONACHEN, M.D.

Certification
EDW. C. HOLMBLAD, M.D., Chairman
VOLNEY S. CHENEY, M.D.
FREDERICK W. SLOBE, M.D.

Finance
VOLNEY S. CHENEY, M.D., Chairman
EDWARD C. HOLMBLAD, M.D.
FREDERICK W. SLOBE, M.D.

Auditing
FRED. W. SLOBE, M.D., Chairman
HENRY S. BROWN, M.D.
ELSTON L. BELKNAP, M.D.

THE SUPERIOR IODINE COMPOUND
FIRST AID
MINOR SURGERY
MYCOTIC INFECTIONS
Solution • Ointment • Dusting Powder

for speedy rehabilitation
Iodolate
(IODOCHOLEATE)

THE SUPERIOR IODINE COMPOUND
Applications bandageable
Wet dressing
Washable Ointment
Stable Iodine-containing Powder
NO TOXICITY through AGEING

IODOCHOLEATE PRODUCTS CORPORATION, 760 Lake St., Newark, N.J.

A New and Finer Pandex

MANY operative refinements not ordinarily associated with a most moderately priced diagnostic x-ray unit have earned the Pandex an enviable reputation. Its list of users—many hundreds of them—is evidence that the Pandex offers unusual value, if judged on a basis of performance or dollars.

Now Westinghouse presents a new and even finer Pandex. It has greater capacity and flexibility, and many improvements which still further simplify operation; it produces radiographs of consistently high quality; the fluoroscopic image is crisp and sharp.

The new Pandex bulletin is just off the press. You will want to read it—and see the interesting photographs that show the varied uses of the Pandex.

May we reserve your copy now? Please write for it—without any obligation.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

WESTINGHOUSE X-RAY DIVISION BALTIMORE, MARYLAND

Association for the Advancement of Industrial Medicine and Surgery Inc.

PURPOSE: To disseminate accurate medical knowledge in reference to the diagnosis and treatment of all conditions arising out of and in the course of employment.

Officers

IRVING GRAY, M.D., President
25 Plaza Street, Brooklyn, N. Y.

HENRY C. JOHNSON, M.D., Vice-President
90 John Street, New York

ROBERT G. WOOLSEY, M.D.,
Recording Secretary
151 Clinton Street, Brooklyn, N. Y.

JOSEPH L. RAMIREZ, M.D., Treasurer
30 Fifth Avenue, New York

JOHN J. BLACKFORD, Executive Secretary
370 Lexington Avenue, New York
(Caledonia 5-9750)

Executive Council

Term Expires 1943
FRED H. ALBEE, M.D., New York
WILLIS W. LASHER, M.D.,
Employers Liability Assurance Co.
JOHN J. WITTMER, M.D.,
Consolidated Edison Co.

Term expires 1944
F. WALLIS DAVIS, M.D., Borden Company
FREDERICK L. MOSSER
Third Avenue Ry. & Bus Lines
HARRY V. SPAULDING, M.D., New York

Term Expires 1945
HACLYON HALSTED, M.D.,
Pelham Manor, New York
ANTHONY AVATA, M.D.,
Hartford Accident & Indemnity Co.
J. W. HARRIS, M.D.,
Aetna Insurance Co.

Committee Chairmen

Public Relations Committee
WILLIS W. LASHER, M.D.
630 Fifth Avenue, N. Y.

Scientific Committee
RUSSELL G. KIMBALL, M.D.
4 Irving Place, N. Y.

Legislative Committee
O. A. BRENENSTUHL, M.D.
345 Hamilton Street, Albany, N. Y.

Membership Committee
JULIUS BRANDWEIN, M.D.
446 West 34th Street, N. Y.

Welfare Committee
SAMUEL FEUER, M.D.
304 Marcy Avenue, Brooklyn, N. Y.

Honorary Membership Committee
H. H. RITTER, M.D.
755 Park Avenue, N. Y.

Delegates to Convention of American Association of Industrial Physicians and Surgeons:
JOHN J. WITTMER, M.D.
WILLIS W. LASHER, M.D.
LEONARD GREENBERG, M.D.

Nominating Committee
EDWARD E. KAPLAN, M.D.
JULIUS BRANDWEIN, M.D.
N. A. RINI, M.D.

Industrial Health Committee
LEONARD GREENBERG
80 Center Street, N. Y.

Annual Dinner October 29, 1942
Annual Meeting December 18, 1942

Component Society of the American Association of Industrial Physicians and Surgeons.

Central States Society of Industrial Medicine and Surgery

Officers 1941-1942

URBAN E. GEBHARD, M.D., Milwaukee
President

C. O. SAPPINGTON, M.D., Dr.P.H., Chicago
President-Elect

EMERY B. NEFF, M.D., Moline, Illinois
Vice-President

FRANK P. HAMMOND, M.D., Chicago
Secretary-Treasurer

Board of Governors

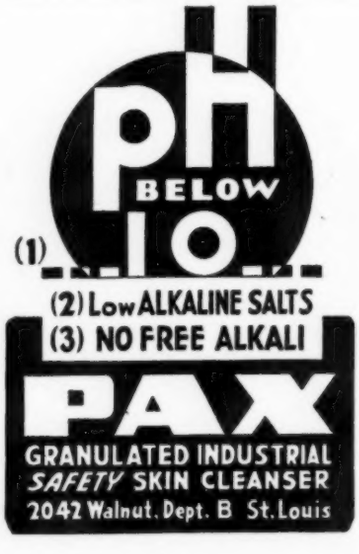
Term to Expire, 1942.
DR. WILLIAM C. GOENNE, Davenport, Ia.
DR. JAMES A. JACKSON, Madison, Wis.
DR. JOHN J. GRANT, Freeport, Ill.

Term to Expire 1943.
DR. HAROLD A. VONACHEN, Peoria, Ill.
DR. HERMAN W. WELLMERLING, Blomington, Ill.
DR. MELVIN L. HOLE, Danville, Ill.

Term to Expire 1944.
DR. JAMES A. VALENTINE, Chicago
DR. DONALD C. CONZETT, Dubuque, Iowa
DR. ROLAND A. JACOBSON, Chicago

Component Society of the American Association of Industrial Physicians and Surgeons.

ALLEN, JR., of the Baton Rouge plant; a molded plaster splint, resembling an arch support and constructed to support the foot in a manner to allow the employee to walk and still not put weight on the injured metatarsal. . . . DR. HOOPER, in "Dental Services in Industry" (page 157), takes the lid completely off of a matter which, along with the common cold, shares parity with the weather, in that "everybody talks about it, but nobody *does* anything." His figures are correct, and his argument is convincing. . . . MR. BAIRD, in "Industry Goes Collegian" (page 162), describes what Servel's DR. DOBBINS is doing in Evansville—in addition to proving, for industries everywhere, that they needn't seek abroad for the scientific answers to the health problems of conversion to war; these answers are "right at their fingertips . . . . in the possession of their own industrial physician.". . . NATIONAL Safety Council, champion of safety and health, employer on its own account, exemplifies in its health program the matters of its advocacy. The *practice* of health and safety is a fundamental part of its operations. . . . LUDWIG TELEKY, in "Occupational Diseases of Bones and Joints" (page 164), confirms his international reputation as an authority in industrial-medical matters. Interestingly again, DR. GEORGE N. EDSON, of the Medical Staff, New York State Department of Labor, finds that men exposed to compressed air may develop diseased bones and joints, "the skeletal lesions of caisson disease" . . . . OUR appraisal (page 170) of DR. OTTO GEIER and his place in the history of industrial medicine ends without ending. As to which, the editorial has something to say. . . . THE Industrial Hygiene Section, the second of the year rounds out the issue. . . . ALL ABOARD for Cincinnati!



New York State Society of Industrial Medicine

1941-1942 Officers

O. A. BRENENSTUHL, M.D.
President
RAYMOND C. ALMY, M.D.
First Vice-President and Treasurer
P. K. MENZIES, M.D.
Second Vice-President
FRANK E. REDMOND
Executive Secretary

Directors

DR. RAYMOND C. ALMY, Auburn
Columbia Rope Co.
DR. H. H. BAKER, Rochester
423 Granite Bldg.
DR. O. A. BRENENSTUHL
345 Hamilton St., Albany
DR. PHILIP L. FORSTER, Albany
367 State St.
DR. CHAS. D. SQUIRES, Binghamton
28 Conklin Ave.
DR. WILLIS C. TEMPLER, Corning
Corning Glass Works
DR. FRANCIS J. RYAN, Syracuse
New York State Railways
DR. B. J. SLATER, Rochester
Eastman Kodak Company
DR. L. W. LOCKE, Utica
288 Genessee St.
DR. A. M. DICKINSON, Albany
New York Central R. R.
DR. M. S. BLOOM, Binghamton
Dunn & McCarthy
DR. E. MacD. STANTON, Schenectady
American Locomotive Company
DR. F. N. C. JERAULD, Niagara Falls
723 Erie Ave.
DR. DONALD C. O'CONNOR, Buffalo
International Railways
American Radiator Co.
DR. RICHARD S. FARR, Syracuse
Consulting Orthopedist
DR. C. W. WOODALL, Schenectady
146 Barrett St.
DR. JOHN L. NORRIS, Rochester
Eastman Kodak Company, Kodak Park
DR. PAUL B. JENKINS, Binghamton
141 Main St.
DR. E. A. VANDER VEER, Albany
28 Eagle St.
DR. OTTMAR W. FREY, Oneida
Oneida Ltd.
DR. HAROLD C. LYMAN, Utica
250 Genessee St.
DR. P. K. MENZIES, Syracuse
511 Medical Arts Bldg.
DR. FRED C. SABIN, Little Falls
23 W. Ann. St.
DR. REEVE M. BROWN, Buffalo
Chevrolet-Motor and Axle
Div. of General Motors

The Industrial Doctor

Official Section of the New York State Society of Industrial Medicine. Now combined with INDUSTRIAL MEDICINE.

Published under supervision of the Ways and Means Committee of the New York State Society of Industrial Medicine. Editorial office, F. E. REDMOND, Managing Editor, 361 Delaware Avenue, Buffalo, N. Y. Articles herein do not necessarily reflect the opinion or policy of this journal nor of the New York State Society of Industrial Medicine.

Editorial Board

B. J. SLATER, M.D. M. S. BLOOM, M.D.
REEVE M. BROWN, M.D.
FRED C. SABIN, M.D.
L. W. LOCKE, M.D.
RAYMOND C. ALMY, M.D.
PAUL B. JENKINS, M.D.
WILLIS C. TEMPLER, M.D.
P. L. FORSTER, M.D.
A. M. DICKINSON, M.D.
CHAS. D. SQUIRES, M.D.
RICHARD S. FARR, M.D.
OTTMAR W. FREY, M.D.
HAROLD C. LYMAN, M.D.
P. K. MENZIES, M.D.
C. W. WOODALL, M.D.
FRANCIS J. RYAN, M.D.
D. C. O'CONNOR, M.D.
F. N. C. JERAULD, M.D.
E. MacD. STANTON, M.D.
E. A. VANDER VEER, M.D.
H. H. BAKER, M.D.
O. A. BRENENSTUHL, M.D.
JOHN L. NORRIS, M.D.

FRANK E. REDMOND, Managing Editor
361 Delaware Ave., Buffalo, New York

An All-Purpose Antiseptic

SAFE AND POWERFUL

The high selectivity of Furmerane enables it to destroy a large variety of pathogenic organisms with a remarkable degree of safety in germicidal concentrations.

This means that Furmerane can be used effectively on mucous membrane and broken skin surfaces without retarding the healing processes.

Furmerane is effective in weak dilutions, and is promptly lethal to cocci, bacilli, protozoa and spirilla.

FURMERANE

(2-HYDROXY-MERCURI FURAN)

Furmerane Solution ..... 1:3000—4-oz., pints and gallons
Furmerane Tincture ..... 1:400 —4-oz., pints and gallons
Furmerane Ointment ..... 1:3000—¼-oz. tubes and 1-lb. jars
Furmerane Nasal Drops with Ephedrine ..... 1-oz., 4-oz., pints and gallons

G·D·SEARLE & CO.

Ethical Pharmaceuticals Since 1888

CHICAGO New York Kansas City San Francisco

SEARLE

American Association of Railway Surgeons

Officers, 1941-1942

J. L. CROOK, M.D., Jackson, Tenn.
President
HAROLD A. SPILMAN, M.D., Ottumwa, Ia.
Vice President
A. J. O'BRIEN, M.D., Ironwood, Mich.
Vice President
JOHN J. BRANDABUR, M.D., Huntington, W. Va., Vice President
T. L. HANSEN, M.D., Chicago, Ill.
Treasurer
R. B. KEPNER, M.D., Chicago, Ill.
Secretary

Executive Board

A. R. METZ, M.D., Chicago, Ill., Chairman
JOHN R. NILSSON, M.D., Omaha, Neb.
WM. J. LANCASTER, M.D., Wilmington, N. C.
D. B. MOSS, M.D., Palmyra, Mo.
IRVING S. CUTTER, M.D., Chicago, Ill.
HARVEY BARTLE, M.D., Philadelphia, Pa.

Association of Surgeons of the New York Central System

Officers

B. L. COLEY, M.D., F.A.C.S.
President
N. W. GILLETTE, M.D.
Vice-President
G. H. MARCY, M.D.
Vice-President
J. G. FROST, M.D.
Vice-President
H. M. LONG, M.D.
Vice-President
H. A. FATHAUER
Secretary-Treasurer
Office of Secretary-Treasurer.
413 LaSalle Steet Station,
Chicago. Telephone WABash 4200

Executive Council

B. L. COLEY, M.D., F.A.C.S.
Chief Surgeon, New York City
L. A. ENSMINGER, M.D., F.A.C.S.
Chief Surgeon, Indianapolis
H. A. FATHAUER
Secretary-Treasurer
GEORGE P. MYERS, M.D., F.A.C.S.
Medical Director, Detroit
F. E. PIERCE, M.D., F.A.C.S.
Chief Surgeon, Chicago
HERBERT M. LONG, M.D.
Chief Surgeon, Pittsburgh
OLIVER G. BROWNE
General Claims Attorney

Association of Railway and Industrial Physicians and Surgeons of Kansas City

Officers

J. E. CASTLES, M.D., President
F. A. FEIERABEND, M.D., Vice-President
RALPH MYERS, M.D., Secretary
CARL N. LINDQUIST, M.D., Treasurer
Kansas City, Missouri

Component Society of the American Association of Industrial Physicians and Surgeons.

Georgia Association of Industrial Surgeons

BENJAMIN H. MINCHEW, M.D., Waycross
President
J. W. SIMMONS, M.D., Brunswick
Vice-President
C. F. HOLTON, M.D., Savannah
Secretary-Treasurer

Component Society of the American Association of Industrial Physicians and Surgeons.

Maryland Association of Industrial Physicians and Surgeons

Officers

DR. HERBERT C. BLAKE, President
Medical Arts Building, Baltimore, Md.
DR. HAROLD BOHLMAN, Vice-President
Medical Arts Building, Baltimore, Md.
DR. ROBERT F. CHENOWITH
1127 St. Paul St., Baltimore, Md.
Secretary-Treasurer

Component Society of the American Association of Industrial Physicians and Surgeons.

PERSONAL

DR. IRVING GRAY, well known to readers of INDUSTRIAL MEDICINE for his scholarly articles on lead poisoning, has been made Active Consulting Physician, Gastro-enterology, Sea View Hospital, Brooklyn.

DR. HARRY W. HARDING, Chief Surgeon of the Moore Shipyards at Oakland, California, has been appointed a member of the Committee on Industrial Medicine of the Alameda County Medical Society.

DR. CHRISTOPHER LEGGO, Plant Physician for the California-Hawaiian Sugar Refinery at Crockett, California, and heretofore Secretary of the WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, who joined the U. S. Public Health Service last month, has been assigned to Jefferson City, Missouri.

DR. RODNEY R. BEARD, a member of the Stanford University Medical faculty in the Department of Preventive Medicine at San Francisco, and Chief Surgeon of Pacific Airways at Treasure Island, will succeed DR. CHRISTOPHER LEGGO as Secretary of the WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS.

DR. FRANK P. HAMMOND, long time Secretary of the CENTRAL STATES and the CHICAGO SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY, has an article in *Illinois Medical Journal*, March, 1942, entitled "Doctors' Ladies—Medicine's Closest Ally."

DR. A. J. LANZA, member A.M.A. Council on Industrial Health, has been appointed lieutenant colonel in the army medical corps and assigned to the Division of Industrial Health in the Office of the Surgeon General, Washington, D. C. Lieutenant-Colonel Lanza will be chief of the Occupational and Military Hygiene Subdivision, Preventive Medicine Division, formed April 18, 1941, with the responsibility of initiating, coordinating and supervising all activities of the medical department in connection with the industrial hygiene program of the army. This subdivision has been making surveys of occupational hazards and diseases in army operative plants.

"INDUSTRIAL MEDICINE: Bulwark of War Production," by J. C. MORRISON in *Medical Economics*, March, 1942, describes DR. FRANK A. BARLOW'S medical department at Wrights', Patterson (New Jersey) plants. Since DR. BARLOW became medical director in 1932, his department has increased from himself and two part-time medical assistants to include eight physicians, 22 nurses, eight first-aid attendants, one physiotherapist, 14 clerks, and an assistant supervisor. The mem-

Milwaukee Association of Industrial Physicians and Traumatic Surgeons

Officers

DR. U. E. GEBHARD, President,
1332 So. 16th St., Milwaukee
DR. GEORGE HOFFMAN, Vice-President,
7006 W. Greenfield, Milwaukee
DR. O. A. SANDER, Secretary-Treasurer
710 W. Plankinton Ave., Milwaukee

Board of Directors

DR. H. G. OAKLAND,
1651 N. 12th St., Milwaukee
DR. S. H. WETZLER,
606 W. Wisconsin Ave., Milwaukee
DR. EDWARD QUICK,
411 E. Mason St., Milwaukee
DR. DAVID MEHIGAN,
231 W. Wisconsin Ave., Milwaukee

Component Society of the American Association of Industrial Physicians and Surgeons.

New Jersey Association of Industrial Physicians and Surgeons

Officers

DONALD O. HAMBLIN, M.D., President
American Cyanamid Co.,
30 Rockefeller Plaza, New York City.
E. E. EVANS, M.D., Vice-President
E. I. DuPont deNemours,
Dye Works Hospital, Deepwater, N. J.
H. IRVING DUNN, M.D., Treasurer
Merck & Co.,
Rahway, N. J.
R. G. BIRRELL, M.D., Secretary
Standard Oil Co. of New Jersey,
Bayway Refinery, Linden, N. J.

Directors

J. M. CARLISLE, M.D.
Merck & Co., Rahway, N. J.
WM. H. McCALLION, M.D.
General Aniline Co.,
722 Westminster Ave., Elizabeth, N. J.
CHESTER T. BROWN, M.D.
Prudential Insurance Co.
Newark, N. J.

Component Society of the American Association of Industrial Physicians and Surgeons.

Michigan Association of Industrial Physicians and Surgeons

Officers

HENRY COOK, M.D., Flint
President
CLARENCE D. SELBY, M.D., Detroit
President-Elect
LEON SEVEY, M.D., Grand Rapids
Vice-President
I. DUANE MILLER, M.D., Grand Rapids
Secretary-Treasurer

Board of Directors

R. H. DENHAM, M.D., Grand Rapids
EARL I. CARR, M.D., Lansing
FRANK T. McCORMICK, M.D., Detroit

Component Society of the American Association of Industrial Physicians and Surgeons.

Chicago Society of Industrial Medicine and Surgery

1941-1942 Officers

THOMAS C. BROWNING, M.D., Chicago
President
FELIX JANSEY, M.D., Chicago
Vice-President
FRANK P. HAMMOND, M.D., Chicago
Secretary-Treasurer

Board of Governors

Terms to Expire 1942:
FRED G. CARLS, M.D., Chicago
CLARENCE W. HENNAN, M.D., Chicago
JOSEPH H. THOMAS, M.D., Chicago
Terms to Expire 1943:
EMILE C. DUVAL, M.D., Chicago
FRED M. MILLER, M.D., Chicago
CHARLES DRUECK, M.D., Chicago
Terms to Expire 1944:
ROLAND A. JACOBSON, M.D., Chicago
O. W. REST, M.D., Chicago
FREDERICK W. SLOBE, M.D., Chicago

The Watchword Is "Prevention"

A Safety Engineer of a large motor company's Industrial Hygiene Laboratories is reported to have recommended the following procedures for the control of industrial dermatitis:

1. The encouragement of—and the necessity for—personal cleanliness of the worker; especially of the skin.
2. The elimination of irritant material from contact with the worker as far as is possible by engineering control.
3. The use of protective clothing properly cleaned, serviced, and disinfected.
4. The application of protective hand creams by the employee before beginning work on exposures likely to cause skin irritation.

About 50% of men at this plant on hood wet sanding operations developed dermatitis until a protective cream was supplied. Now only an occasional case develops.

* * *

Medical authorities state that 57 distinct and different harmful bacteria have been found on the arms and hands of the average clean, healthy individual. These bacteria are perhaps the most important source of primary infections, while cutting oils and other media common to industrial environment act merely as carriers in transporting the germs from the surface of the skin, where they are quite harmless, into the pores where they germinate and produce pimples, sores and rashes.

* * *

For workers subjected to cutting-oil infections, West has perfected WESCOL. When added to cutting-oil, WESCOL disinfects it thoroughly, to safeguard workers from infection . . . or re-infection.

* * *

As an effective protection from various chemicals, caustics and the like, the West Protective Creams act as invisible "gloves", keeping the dangerous materials from irritating or injuring the worker's hands. There are now 9 basic West Protective Creams, and the West Laboratories are constantly at work on new formulae to cover specific cases where unusual irritants are encountered.

* * *

To complete the job of worker-protection, there are many other West products, like Coro-Noleum and Comax (for disinfecting washrooms, etc.); Showersan (to combat the Athlete's Foot parasite in showers and pools): and various deodorants for spraying. Safety-minded industrial sanitation engineers have found that the cost of these *preventive* measures is more than made up in the saving in sickleave, hospitalization and compensation claims.

A 3-way plan for production step-up through Healthier Hands

This recommended prevention of occupational dermatitis pays off *not only in cutting down compensation claims*—but in the increased work efficiency of every man employed.

1. **LAN-O-KLEEN* FOR WASHING HANDS** is the basic start—a soap with a real PLUS value; not only CLEANS the grimiest hands—gently—but also "WORK-CONDITIONS" them. Lan-O-Kleen contains emollient LANOLIN—the closest thing to natural skin oil. This lanolin content buffers the mild soap alkali; leaves fingers supple and limber. Lan-O-Kleen washed hands are better able to do good work—and turn out more of it. It **pays.**
2. **WESCOL* IN YOUR CUTTING OIL** helps prevent oil dermatitis, otherwise easily spread from man to man in the recirculation of your cutting oils and cooling compounds. It **pays** to know about WESCOL—and how effectively it disinfects.
3. **WEST PROTECTIVE CREAMS** are an external protection to **guard** your workmen from any of a wide variety of skin irritants which may lead to DERMATITIS. Investigate! IT PAYS!

*Trade Mark U. S. Pat. Off.

WEST DISINFECTING COMPANY

SERVING AMERICAN INDUSTRY FOR OVER 50 YEARS

55 BRANCHES Coast-to-Coast and in Canada

CLIP TO YOUR BUSINESS LETTERHEAD, PLEASE

West Disinfecting Company, Dept. IM,
42-16 West Street, Long Island City, N.Y.

Please send me your latest bulletins on
☐ Lan-O-Kleen Hand Cleaner ☐ Wescol ☐ Protective Creams

Name_____ Title_____

Name of Company_____

Street and Number_____

City and State_____

IF YOU WISH COPIES OF THE COLOR POSTER SHOWN IN THE ABOVE PHOTOGRAPH, USE THE COUPON AND CHECK ☐ HERE

"ALL PURPOSE" Industrial Dressing Chair

See it at the American Association Meeting, Cincinnati, April 13

One of the Features of the Aloe Display—booths 29, 30, 31—at the Annual Meeting of the American Association of Industrial Physicians and Surgeons, this novel chair was designed by Lucille E. Donchess, R.N., Carnegie-Illinois Steel Company, Gary, Indiana. Its principle is based on the fact, confirmed by long experience in the Tin Plate Mill Hospital, that a man—particularly a hurt man—feels much more secure when he is straddling a chair and facing its back. Blood flow to the hand is lessened and in case of faintness the patient's head drops forward to rest on the shelf. See the many other features which make it truly an "All-Purpose" industrial chair. Check these other highlights on your "see" list: Working Demonstrations of Laboratory Technic; Actual Application of new Plaster Bandage; Complete Specifications for a Defense Plant Hospital.

Industrial Division

A. S. ALOE COMPANY

1831 OLIVE STREET • ST. LOUIS, MO.

bers of the staff maintain day and night service seven days a week. In a recent 30-day period they handled 32,603 visits, including 14,382 "medicals" (headaches, stomach complaints, etc.,) 751 physical examinations, and 593 eye cases.

AMONG the industrial physicians and surgeons who have gone into the Army are the following members of the CENTRAL STATES SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY: RAYMOND M. BALDWIN, Beloit, Wisconsin; LEO K. COOPER, Gary, Indiana; DAVID W. FEY, Peoria, Illinois; LEE R. MARTIN, Council Bluffs, Iowa; EMERY B. NEFF, Moline, Illinois; W. H. SCHOWENGERDT, Champaign, Illinois; DAVID H. SLUSS, Indianapolis; JAMES A. SPENCER, Flint, Michigan; K. F. STOTZ, Chicago; EUGENE L. WALSH, Chicago.

DR. JOHN PAUL RUSSELL, First Director of the Division of Industrial Hygiene, California State Board of Health, of Berkeley, California, age 40, died from heart disease on March 18, 1942. His passing is a great loss to industrial hygiene. DR. RUSSELL received his medical degree from George Washington University in 1924. He had retired from the United States Army with the rank of captain because of ill health, and later attended the University of California,

Western Association of Industrial Physicians and Surgeons

Officers

R. T. LEGGE, M.D., F.A.C.S., President
Professor of Hygiene, University of California, Berkeley, California.

CHRISTOPHER LEGGO, M.D., Secretary
Plant Physician, California and Hawaiian Sugar Refining Corp., Ltd., Crockett, California.

J. M. McCULLOUGH, M.D., Treasurer
Plant Physician, American Smelting & Refining Company, Selby Plant, Union Oil Company, Oleum Plant, Crockett, California.

Directors

C. A. WALKER, M.D., F.A.C.S.
Chief Surgeon, Southern Pacific Company Pacific Lines, Southern Pacific Hospital, San Francisco, California.

JOHN P. RUSSELL, M.D.
Industrial Hygiene Service State of California, Berkeley.

LOUIS D. CHENEY, M.D.
Plant Physician, Goodyear Rubber Company, Los Angeles, California.

BENJ. FREES, M.D., F.A.C.S.
Chief Surgeon, Armour and Company, Firestone Tire & Rubber Co., 947 W. 8th Street, Los Angeles, California.

Executive Secretary,
ELIZABETH CAFFREY, R.N., P.H.N.
California and Hawaiian Sugar Refining Corp., Ltd., Crockett, California.

Component Society of the American Association of Industrial Physicians and Surgeons.

Hawaiian Society of Industrial Physicians and Surgeons

DR. R. T. TREADWELL, Kohala, Hawaii
President

DR. T. W. KEAY, Pepeekeo, Hawaii
Vice-President

DR. H. M. PATTERSON, Olaa, Hawaii
Secretary-Treasurer

Component Society of the American Association of Industrial Physicians and Surgeons.

Florida Association of Industrial Surgeons

Officers

A. M. BIDWELL, M.D., President
FREDERICK OETJEN, M.D., President-Elect
KENNETH MORRIS, M.D., Vice-President
T. H. ROBERTS, M.D., Secretary-Treasurer
P. O. Box 425, Lakeland, Florida.

Directors

J. W. ALSOBROOK, M.D.
F. W. GLENN, M.D.
FRANK D. GRAY, M.D.
HARRISON A. WALKER, M.D.

Component Society of the American Association of Industrial Physicians and Surgeons.

New England Conference of Industrial Physicians

Officers

DR. J. NEWTON SHIRLEY, Director
Arrow Mutual Liability Insurance Co., Chestnut Hill, Massachusetts.

DR. THOMAS L. SHIPMAN, Assist. Director
Medical Director, General Electric Co., West Lynn, Massachusetts.

DR. J. ALLAN THOMPSON,
Secretary-Treasurer
900 Massachusetts Ave.,
Cambridge, Massachusetts

Board of Directors

DR. HALSTEAD G. MURRAY
Dennison Manufacturing Company, Framingham, Massachusetts.

DR. EUGENE F. McCARTY
Rumford, Maine (Oxford Paper Co.).

DR. DANIEL L. LYNCH
New England Telephone & Telegraph Co., Boston, Massachusetts.

Component Society of the American Association of Industrial Physicians and Surgeons.

The "Triple Dye" Treatment for Burns Now in Jelly Form for Quick Availability

JELLY DYMIXAL

(U. S. Pat. 2103309)

Dymixal — the Triple Dye Treatment used extensively for second and third degree burns — is now available in the form of a water-soluble jelly.

Jelly Dymixal is applied by spreading thinly over burned areas and allowing to dry between successive applications. Like Dymixal Solution, it inhibits the growth of both gram-positive and gram-negative infecting organisms; alleviates pain; forms a flexible eschar; facilitates proliferation of epithelium.

Jelly Dymixal is particularly adapted to first-aid kits because it is always ready for immediate use. Contains two percent of Dymixal (Hexamethyl Violet 46.1%, Brilliant Green 30.8%, Neutral Acriflavine 23.1%).

Jelly Dymixal is supplied in 2-oz. tubes.

Powder Dymixal for preparing extemporaneous solutions is available in 6.5 gm. and 65 gm. bottles.

Write for Complete Literature.

McNeil Laboratories

Incorporated

Philadelphia · Pennsylvania

RELIEVABLE PAIN vs. PRODUCTION

YOUR PROBLEM . . . To return your patients to work *quickly*

OUR PROBLEM . . . To have you use Aciform II

Let's get together to solve these problems for
Victory Over Disabling Pain

THE following* are brief excerpts from several of many letters from medical directors of prominent corporations as to the time-saving efficacy and safety of

ACIFORM II

"FROM our standpoint as industrial surgeons, ACIFORM II has been valuable because it has shortened the time of disability. But what is even more important, each and every patient has had immediate or almost immediate relief from very severe pain."

"IT IS too early to say that ACIFORM II is a cure, but in all my practice and the different remedies I have used in treating arthritides, sciatic-neuritis, etc., it has given quicker results."

"I AM convinced that ACIFORM II has a definite use in industrial cases. The relief obtained is almost miraculous; cases which were usually laid up several days or week, are now returned without loss of time."

"THERE is no question but that the use of ACIFORM II has practically eliminated the loss of time from this common complaint." (lumbago)

"WE HAVE used ACIFORM II in our regular industrial work and have had better results with it than with any previously used measures."

"IN ALL these cases I have had startling results; especially in 'low back cases' all patients had immediate relief."

"IN ALL cases treated I have not found any after effects or bad results from ACIFORM II."

"I FEEL that ACIFORM's Chief indication is where one can palpate local tenderness in cases of myositis, fibrositis, fascitis and allied conditions."

"IN EIGHT cases of so-called lumbago, painful backs and necks, of which we have many in our mines, all have been benefited. Only two or three injections were given."

"OUR results lead us to believe that ACIFORM II should be employed in treatment of soldiers because it shortens period of treatment."

"A CASE of fibro-myositis of the lower back with tenderness in both ilio-lumbar angles responded very rapidly to two injections after a month's failure of appreciable improvements with the other usual types of therapy."

"I HAVE had some rather startling results, and in some instances, no results at all. In several cases of resistant sciatica, I secured prompt, and, up to now, permanent relief."

"I have tried ACIFORM II in 22 cases of arthritis, neuritis, lumbago, etc., in many of them with striking results."

"I HAVE found ACIFORM II an effective reliever of pain. It was quite useful as an adjunct in symptomatic treatment while studies of underlying pathology were carried on."

Aciform II—*Keep it in Stock in your Dispensary*

Stable—Will Not Deteriorate

For informative literature address

ACIFORM Corporation

520 No. Michigan Ave. Chicago

**Identifications on Qualified Requests.*

where he received his degree in Public Health. He was a Director of the WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS and has contributed many papers on industrial medicine. Surviving are his wife and son.

DR. CHARLES ALFRED DUKES of Oakland, California, a native of Iowa, died March 14, 1942, at age 70, from diabetes. DR. DUKES graduated from Cooper Medical College (Stanford) 1895. A successful surgeon on Merritt and Highland Hospital staffs, he was honored as President of Alameda County Medical Society and California State Medical Society, and Vice-President of American College of Surgeons and the American Medical Association. He was a charter member of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, and at the time Chief Surgeon of the Standard Oil Company at Richmond, California. He leaves a wife and two married daughters.

DR. R. R. SAYERS, Director of the Bureau of Mines, announces the appointment of DR. WILLIAM B. FULTON, Senior Surgeon in the U. S. Public Health Service Reserve, and former Director of the Bureau of

American Industrial Hygiene Association

Officers 1941-1942

DONALD E. CUMMINGS, President
Director, Div. of Industrial Hygiene, Department of Medicine, University of Colorado School of Medicine and Hospitals, Denver, Colorado.

PROFESSOR PHILIP DRINKER, President-Elect
Division of Industrial Hygiene, Harvard School of Public Health, 55 Shattuck Street, Boston, Massachusetts.

GORDON C. HARROLD, Ph.D., Secretary
Industrial Hygiene Laboratories, Chrysler Corporation, 341 Massachusetts Avenue, Detroit, Michigan.

THEODORE HATCH, Treasurer
Associate Profesor of Industrial Hygiene, University of Pennsylvania Medical School, Philadelphia, Pennsylvania.

Directors

J. J. BLOOMFIELD
Sanitary Engineer, National Institute of Health, U. S. Public Health Service, Bethesda, Maryland.

ROY S. BONSIB
Chief Safety Inspector, Standard Oil Company of N. J., New York, NewYork.

WARREN A. COOK
Division of Industrial Hygiene and Engineering Research, Zurich General Accident & Liability Insurance Company, Chicago, Illinois.

KARL L. DUNN
Industrial Hygienist, Corning Glass Works, Corning, New York.

WM. G. FREDRICK, Ph.D.
Bureau of Industrial Hygiene, Detroit Department of Health, 1151 Taylor Avenue, Detroit, Michigan.

DON P. IRISH, Ph.D.
Biochemical Laboratory, Dow Chemical Company, Midland, Michigan.

R. A. KEHOE
Director, Kettering Laboratory of Applied Physiology, College of Medicine, University of Cincinnati, Eden Avenue, Cincinnati, Ohio.

CLARENCE W. MUEHLBERGER, Ph.D.
State Toxicologist, Michigan Department of Health, Lansing, Michigan.

F. A. PATTY
Director, Industrial Hygiene Laboratory, Fidelity & Casualty Company of N. Y., 80 Maiden Lane, New York, New York.

H. H. SCHRENK, Ph.D.
U. S. Bureau of Mines, 4800 Forbes Street, Pittsburgh, Pennsylvania.

REUEL C. STRATTON
Supervising Chemical Engineer, Engineering and Inspection Division, The Travelers, Hartford, Connecticut.

M. F. TRICE
Division of Industrial Hygiene, North Carolina State Board of Health, Raleigh, North Carolina.

WILLIAM P. YANT
Director, Dept. of Research and Development, Mine Safety Appliances Co., Braddock, Thomas & Meade Streets, Pittsburgh, Pennsylvania.

American Conference on Industrial Health

Officers

VOLNEY S. CHENEY, M.D., President
EDWARD C. HOLMBLAD, M.D.
First Vice-President
FREDERICK W. SLOBE, M.D.
Second Vice-President
HAROLD A. VONACHEN, M.D., Treasurer
JAMES A. VALENTINE, M.D., Secretary
C. O. SAPPINGTON, M.D., Dr. P. H.
Executive Director
ARMOUR G. PARK, Executive Secretary
540 N. Michigan Ave., Chicago, Illinois

TO provide an organization, not for pecuniary profit, in which all agencies and societies, both medical and lay, concerned with the problems of industrial health can hold membership and can meet together in conference for the study, discussion and careful consideration of all industrial health problems and procedure; to engage in scientific research to determine the cause, nature, prevention and cure of diseases and injuries of occupations; to assist in establishing and supervising industrial health clincs to serve small industries; to establish and maintain hospitals which will furnish facilities for the care, treatment and study of occupational injuries and diseases; to make surveys of

28% LESS NICOTINE IN THE SMOKE—BUT NO REDUCTION IN SMOKING PLEASURE

WHEN improving a patient's smoking hygiene, many a physician simplifies his program by advising the regular use of Camel cigarettes—the slower-burning brand. Medical-research authorities* state, and Camel's scientific tests on hundreds of samples** confirm, that a slower-burning cigarette produces less nicotine *in the smoke.*

Nicotine, as the body of scientific research agrees, is by far the leading component of tobacco smoke having systemic potentials.

Slower-burning Camels not only offer a reduction of nicotine in the smoke but assure your patients of more mildness, coolness, and flavor. Naturally, your recommendation of Camel cigarettes helps to promote patients' cooperation.

● In recent laboratory tests, Camels showed 28% less nicotine *in the smoke itself* than the average of the 4 other largest-selling brands tested—less than in the smoke of any of them. In the same tests, Camel burned 25% SLOWER than the average of the 4 other largest-selling brands tested—slower than any of them.

**J.A.M.A., 93:1110—October 12, 1929*
Brückner, H—Die Biochemie des Tabaks, 1936

***The Military Surgeon, Vol. 89, No. 1, p. 7, July, 1941*

SEND FOR a reprint of the most important medical article on smoking in modern times—written by an outstanding physician—and reprinted from The Military Surgeon, July, 1941. Write today for this highly informative analysis. Camel Cigarettes, Medical Relations Division, 1 Pershing Square, New York City.

*Name*_____

*Address*_____

*City*_____ *State*_____

CAMEL

THE CIGARETTE
OF COSTLIER TOBACCOS

The ultimate strength of a nation is based on the physical well-being of its people. Of small worth in the defense of America would be a powerfully equipped Army and Navy—without a physically-fit personnel. Yes, and of small worth such military might without the support of a physically-fit civilian population . . . in the defense industries, the mines, the farms, and countless other occupations essential to the nation's welfare.

Vitally important, therefore, is the part our medical profession plays in maintaining Public Health. And standing shoulder to shoulder with you are the manufacturers of pharmaceuticals, apparatus and supplies . . . sparing no effort to see that everything essential to the physician's armamentarium is forthcoming.

Since X-Ray screens are essential to the radiological profession, Patterson has long been prepared to maintain production of X-Ray Screens through this emergency. An adequate supply of restricted chemicals has been assured. Research as well as production are being stepped up. As always, our extensive testing facilities and highly-trained personnel are maintaining laboratory control over every process from raw materials to finished screens. The roentgenologist will continue to receive both intensifying and fluoroscopic screens made to Patterson's acknowledged highest standard of quality.

PATTERSON'S
facilities devoted 100%
to Public Health and Defense
of the Democracies

THE
PATTERSON SCREEN CO.
TOWANDA, PA., U. S. A.

Patterson X-Ray Screens

industrial medical services and recommendations for their improvement; to solicit, receive and administer funds for any purpose that will advance and/or improve industrial health; to establish undergraduate and/or post-graduate courses in industrial medicine and surgery and/or to cooperate with medical schools and industries in maintaining such courses; and to use all those means, which from time to time, may seem wise, for the advancement of industrial health.

Institute of Traumatic Surgery
Officers
PAUL B. MAGNUSON, President
JAMES J. CALLAHAN Vice-President
ROLAND A. JACOBSON
Secretary and Treasurer
Board of Governors
KELLOGG SPEED ARTHUR H. CONLEY
J. B. WILLEMS ERIC OLDBERG

Industrial Hygiene, as Chief of the Health Division in the Bureau of Mines, where he will direct the Bureau's expanding activities in safeguarding the physical welfare of the thousands of workers in the nation's mineral industries.

DAVID E. LEVIN, PH.D., many years Assistant Professor of Chemistry, University of Pittsburgh, has been appointed Technical Director for Carbisulphoil Company, Dallas, Texas, manufacturers of Foille.

THE CENTRAL STATES SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY will hold its 1942 Annual Meeting jointly with the CHICAGO SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY as an all day scientific session in Chicago on Friday, May 8, 1942.

GENERAL

MEDICAL service figures for the year 1941 in 14 plants of one of the country's large manufacturing industries: Employees, 56,021; sick cases, 15,426; disability accidents, 599; minor accidents, 159,786; surgical treatments, 285,252; medical treatments, 145,279.

DR. R. R. SAYERS, U. S. Bureau of Mines, states that hard coal-tar pitch, either granulated or flaked, is the best extinguisher for magnesium incendiary bombs. Water will not extinguish them.

ITEM in a letter from one of our subscribers, somewhere in the United States, showing that it *can* happen here: "The reply to our recent threatened air raid was a thrilling spectacle—a moonlight night—brilliant stars—many powerful searchlights with rays converging in an apex overhead—the flash and boom and concussion of anti-aircraft guns—all this made it an occasion."

ITEM *versus* the popular idea that the death rate in industries is higher than in the general population:

Data from 88 large cities (U.S.): Deaths per 1000 population, seven weeks, annual rate—week ended February 21, 1942 = 13.0; corresponding week, 1941 = 13.8.

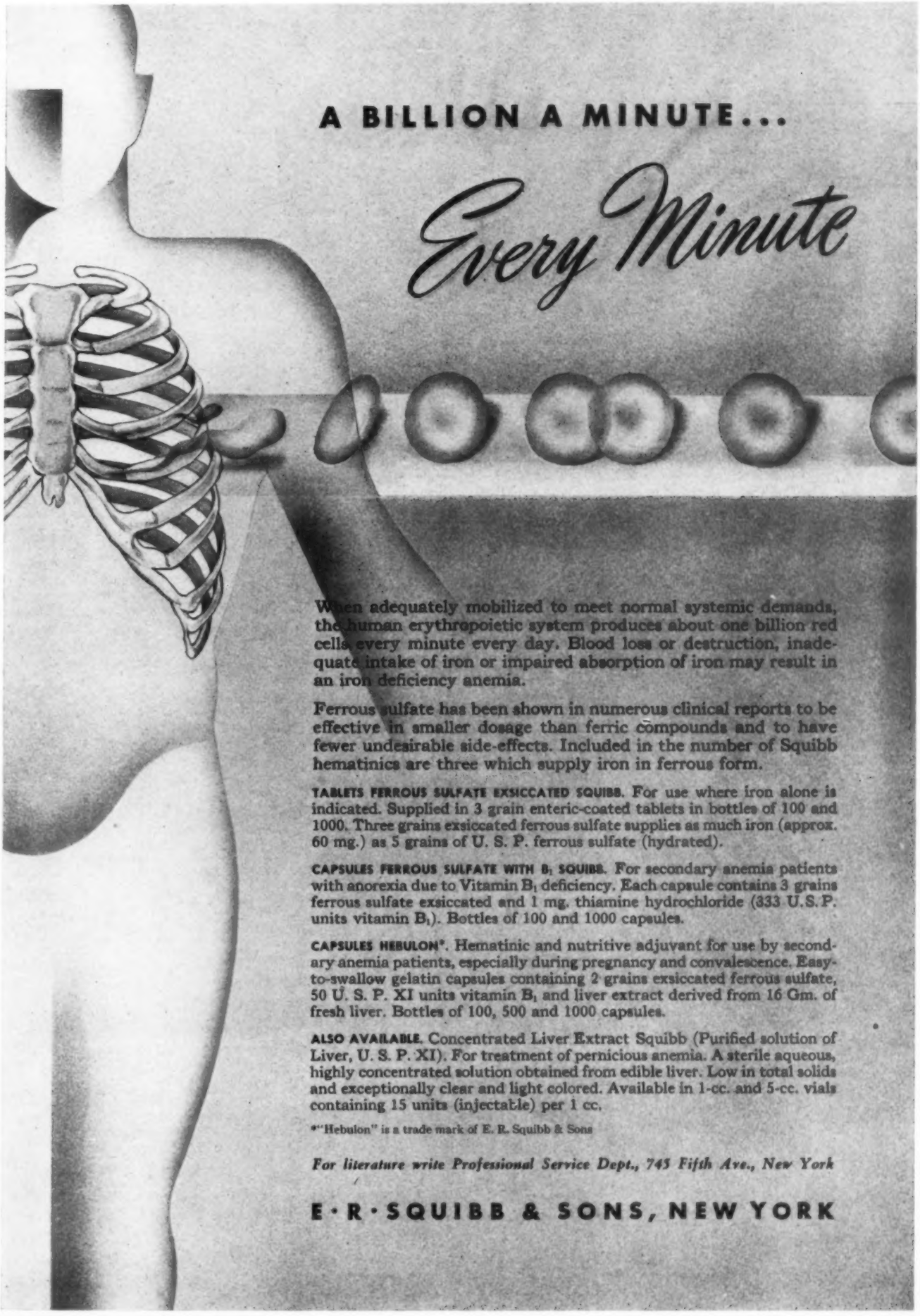
Data from insurance companies: Death claims per 1000 industrial policies, seven weeks, annual rate—week ended February 21, 1942 = 10.2; corresponding week, 1941 = 11.2.

—From Weekly Mortality Index, "Deaths During Week ended February 21, 1942," Bureau of the Census, Department of Commerce, U.S.P.H. Reports, March, 6.

ITEM: "We observed a situation a few days ago that will interest you. A salesman was demonstrating a metal spray gun in a steel plant here. He brought out the point that no danger was associated with the use of this spray gun. That afternoon and night he was down with metal fume fever."

INCENTIVE TO HEALTH: Affidavits from several physicians to the effect that the condition of a man's health justified him in applying for new tires failed to obtain them for a New York automobile owner when the city rationing administrator confirmed a local board's ruling that occupation and not health was the determining factor.

MEDICAL care at $21 a year per person can be provided for industrial workers and their families, declares Dr. Franz Goldmann, of Yale University School, as a result of a study of four industrial health plans in eastern and southern states. He attributes the low cost to four



A BILLION A MINUTE...

Every Minute

When adequately mobilized to meet normal systemic demands, the human erythropoietic system produces about one billion red cells every minute every day. Blood loss or destruction, inadequate intake of iron or impaired absorption of iron may result in an iron deficiency anemia.

Ferrous sulfate has been shown in numerous clinical reports to be effective in smaller dosage than ferric compounds and to have fewer undesirable side-effects. Included in the number of Squibb hematinics are three which supply iron in ferrous form.

TABLETS FERROUS SULFATE EXSICCATED SQUIBB. For use where iron alone is indicated. Supplied in 3 grain enteric-coated tablets in bottles of 100 and 1000. Three grains exsiccated ferrous sulfate supplies as much iron (approx. 60 mg.) as 5 grains of U. S. P. ferrous sulfate (hydrated).

CAPSULES FERROUS SULFATE WITH B_1 SQUIBB. For secondary anemia patients with anorexia due to Vitamin B_1 deficiency. Each capsule contains 3 grains ferrous sulfate exsiccated and 1 mg. thiamine hydrochloride (333 U.S.P. units vitamin B_1). Bottles of 100 and 1000 capsules.

CAPSULES HEBULON*. Hematinic and nutritive adjuvant for use by secondary anemia patients, especially during pregnancy and convalescence. Easy-to-swallow gelatin capsules containing 2 grains exsiccated ferrous sulfate, 50 U. S. P. XI units vitamin B_1 and liver extract derived from 16 Gm. of fresh liver. Bottles of 100, 500 and 1000 capsules.

ALSO AVAILABLE. Concentrated Liver Extract Squibb (Purified solution of Liver, U. S. P. XI). For treatment of pernicious anemia. A sterile aqueous, highly concentrated solution obtained from edible liver. Low in total solids and exceptionally clear and light colored. Available in 1-cc. and 5-cc. vials containing 15 units (injectable) per 1 cc.

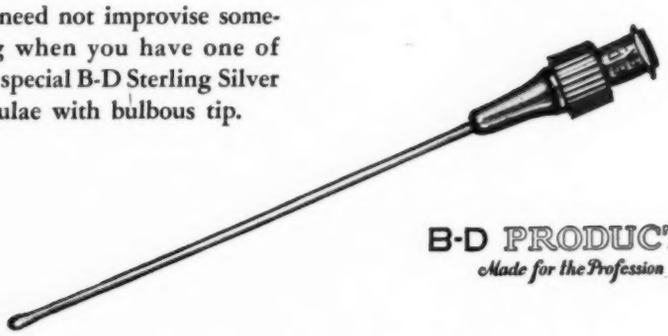
*"Hebulon" is a trade mark of E. R. Squibb & Sons

For literature write Professional Service Dept., 745 Fifth Ave., New York

E·R·SQUIBB & SONS, NEW YORK

What do you use to irrigate a Puncture Wound?

You need not improvise something when you have one of these special B-D Sterling Silver Cannulae with bulbous tip.



B-D PRODUCTS
Made for the Profession

IRRIGATION of deep cuts, puncture wounds and abscesses is greatly simplified. Completely malleable, it can be bent as desired to follow the course of the wound. Effective irrigation may be performed without causing additional trauma.

The B-D Silver Cannula may be used in conjunction with any regular Luer or Luer-Lok Syringe or, when easy one-hand control is desired, with the special No. 2034 ⅛ oz. Asepto Syringe illustrated below.

Sizes suitable for practically every requirement are available. Your regular dealer can supply you. Prices are as follows: ¾" and 1¼", $1.00; 2¾", $1.35; 4", $1.40; 5", $1.50; 7", $1.65. The No. 2034 special ⅛ oz. Asepto Syringe only with Luer slip, $1.25 each.

BECTON, DICKINSON & CO., RUTHERFORD, N.J.

factors: (1) full use of preventive medicine; (2) even spread of risks over a large group; (3) economies resulting from group practice; and (4) integration of curative and preventive services.

—*Modern Med.*, March, 1942.

TRAILER laboratories are being used by U. S. Public Health Service to protect the health of the American soldier in field maneuvers. The work is largely confined to bacteriologic examinations of milk, ice cream, wet ice boxes, ice cream scoops, dishes in establishments which may be patronized by soldiers, and of streams and public, semi-public and private water supplies.

—*Modern Med.*, March, 1942.

THE fifth annual meeting of the National Conference of Governmental Industrial Hygienists will be held in Washington, D. C., April 9-11. Among the many papers to be presented are the following: MR. VERNE A. ZIMMER, director, Division of Labor Standards, U. S. Department of Labor, Washington, D. C., "The Activities of the Committee for the Conservation of Manpower in War Industries" and DR. JOHN G. CUNNINGHAM, Toronto, Canada, Province of Ontario Department of Health, "Canadian Experience in War Industries."

EXCESSIVE overtime work slows up industrial production regardless of the willingness of workers, DR. ANDREW G. IVY reported recently to the Congress on Industrial Health. He said British wartime experience showed best results are obtained with a six-day week, limiting men to 56 hours and women to 48. "More than 60 hours a week leads to lost time during work, increased absenteeism, and sickness." Greater responsibility for industrial health will rest on the family physician as the number of women in industry rises, DR. CLARENCE D. SELBY warned the same conference. He pointed out the absentee rate for women workers is twice as high as for men.

—*Medical Economics*, March, 1942.

IN FEDERAL service, as in industry, increased employment has been accompanied by a proportionate increase in the number of injuries. In 1941 there were 62% more Federal employees than in 1936, and 110% more injuries. Costs have increased in smaller proportion; fatalities declined for several years; non-fatal injuries went up. Compensation in 1941 was 57% higher than in 1936; increased most in 1941.

NEW YORK UNIVERSITY Center for Safety Education has re-issued its "Industrial Hygiene and Occupational Diseases," the 200-page mimeographed volume containing the 15 lectures of the course recently conducted by the Center in cooperation with the National Conservation Bureau. This book is priced at $1.25.

AT THE first Conference on Medical Service Plans, Chicago, February 14, it was pointed out that "interest in some form of prepayment for medical services has been moving along three well-defined fronts: (1) Group clinic or consumer plans such as the Ross-Loos Clinic or the Transport Workers Medical Plan, of which there are 17 such in operation with a total enrollment of 100,000; (2) employee-employer mutual benefit associations (300 in operation), and the commercial insurance company plans (at least 250) providing cash indemnity benefits totaling $365,000,000 annually; and (3) non-profit medical service plans sponsored by medical societies, of which there are 33 in operation in nine states with an enrollment in excess of 750,000. The non-profit medical society sponsored programs are developing most rapidly and give the best promise of contributing toward a better distribution of medical service."

—Editorial, *Delaware State M. J.*, March.

NEW HAVEN county physicians, in cooperation with the Department of Preventive Medicine, Yale School of Medicine, have approved the creation of an Industrial Medical Service in factories which do not now have adequate medical service, according to *Science*. Plans have been drawn for the organization of the service in five plants in New Haven County, each having a personnel of not more than 300. The service will consist of a director-physician trained in industrial medicine, who is to be responsible for administration and for meeting problems in industrial hygiene, and a nurse trained in industrial medicine. A grant to defray some of the initial expenses has been made by the New Haven Foundation. "It is estimated that two years will be

When the part is as effective as the whole

VOLUME FOR VOLUME, plasma is therapeutically as effective as whole blood in the transfusion treatment of shock due to any cause except massive hemorrhage. Blood volume is controlled and maintained chiefly by osmotic effect of plasma proteins which are characteristically diminished during shock. Formed elements, constituting about 45% of whole blood, play a minor part in balance between circulatory and tissue fluids.

Plasma proteins are believed to supply practically all the protein requirements of the body cells and probably contribute to repair and replacement of damaged tissue.[1]

Transfusion of plasma will not cause further hemoconcentration, a phenomenon usually present in shock and severe burns. Finally, pooled plasma requires no typing or cross-matching and therefore may be administered without delay.

'Lyovac' Normal Human Plasma possesses all of these advantages and, in addition, is *stable* because it is thoroughly dehydrated and sealed under vacuum. Dried plasma is stated to require no refrigeration and may be kept indefinitely.[2] Restoration to the liquid form is simple and rapid and hypertonic plasma may be readily made up if necessary. Each 250 cc. of restored 'Lyovac' Normal Human Plasma provides as much osmotically active protein as 500 cc. of fresh, whole blood and is essentially the same as the original plasma.

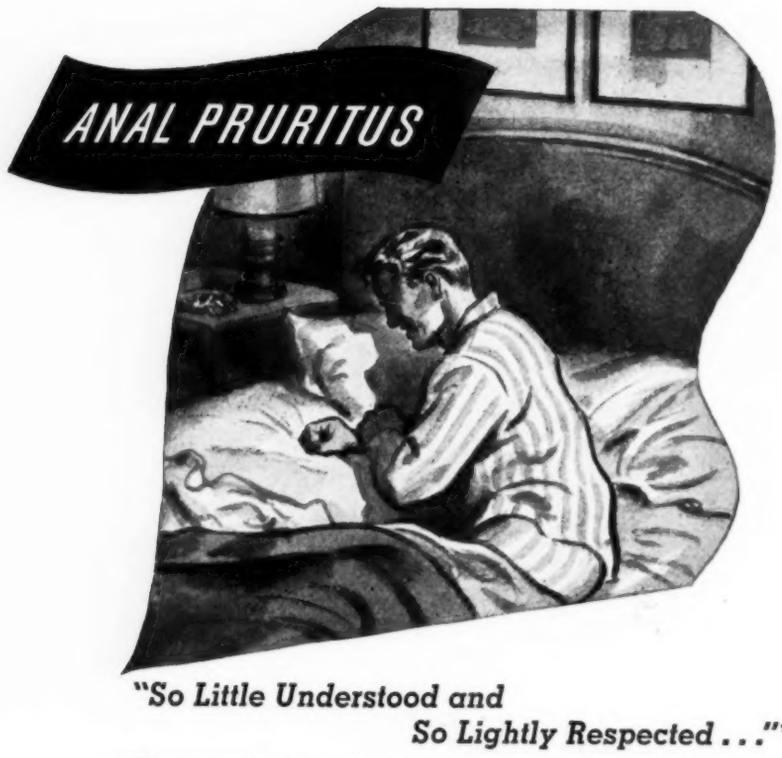
1. Editorial: Surgery, Gynecol., & Obstet., 73:886, Dec., 1941
2. Medical Preparedness: J.A.M.A. 117:1711, Nov. 15, 1941

How Supplied:

'Lyovac' Normal Human Plasma is supplied in a package containing one ampoule-vial to yield 250 cc. of plasma when restored to its original volume, together with distilled water, connecting needle, and air filter. Equipment for intravenous injection is separately packaged.

'Lyovac,' Normal Human Plasma

SHARP & DOHME • PHILADELPHIA



"So Little Understood and So Lightly Respected . . ."*

Few symptoms can be more unnerving than the torment of pruritus ani. But through the specific antipruritic influence of Calmitol relief can be given the patient at the first visit. Calmitol stops itching, regardless of cause, and for prolonged periods. Thus, even before the responsible etiologic process is identified, subjective comfort can be achieved by the application of Calmitol Ointment directly onto the involved area.

Thos. Leeming & Co. Inc.
101 West 31st Street, New York

CALMITOL
THE DEPENDABLE ANTI-PRURITIC

Calmitol presents chlor-iodo-camphoric aldehyde, levo-hyoscine oleinate, and menthol, in an alcohol-chloroform-ether vehicle. It controls pruritus by blocking cutaneous receptor organs and nerve endings. It is protective, bacteriostatic, and induces mild active hyperemia aiding in disposal of toxins.

*Hermance, O. W., and Bacon, H. E.: Pruritus Ani, in Piersol, G. M.: Cyclopedia of Medicine, Philadelphia, F. A. Davis Company, 1934, vol. 10, p. 1135.

required to determine whether this service is justifiable and worth continuing. At the end of this period, the Section of Preventive Medicine of the Yale School of Medicine will review the project. The opinion of the New Haven Medical Association will be solicited at that time. A committee from the New Haven Medical Association will censor the operation of the plan to handle any complaints and any proposed changes.

—*Med. Rec.*, March, 1942.

DR. ROBERT B. AIKEN, Medical Director of Industrial Hygiene, reporting on a small Vermont plant: " . . . worthy of mention is the fact that by having the physician in attendance at the plant we were able to save considerable lost time that would have been incurred by the various medical cases having to go to the doctor's office to have treatments. During the month of December there were 87.5 hours lost by the men having to go uptown for treatments. During January there were only seven hours lost for the same reason. This represents a saving of 80.5 hours in machine and labor time." —*Industrial Hygiene*, March, 1942.

RESEARCH with us is a serious undertaking, and not an occupational disease. . . . If we want to serve our country, we should submit every course, every day of every course, every research project, every appointment, and every expenditure to two tests. Every part of our work should meet one or the other of these tests or be instantly abandoned. The two tests are, first, does it help to win the war? And second, has it an intellectual purpose, has it intellectual content, and does it require intellectual effort? Vocational training courses that will help win the war are courses that we must invent or foster. Vocational training courses that will not, have no place in the University, for they are a waste of its resources. The manufacture of gadgets that will help win the war is a necessary and laudable part of the University's work. The manufacture of gadgets which have no military purpose is not a university activity. Neither is that kind of research which is merely aimless wandering through the fields of fact, nor that kind of teaching which is merely transmitting information which the student could get out of a book over the weekend. This is waste.

—From "The University at War," an address to the faculty of the University of Chicago by PRESIDENT ROBERT M. HUTCHINS, January 7, 1942.

OBSERVATION from a bulletin on safety training released by the War Production Board: "In many localities, safety has suffered from a sentimental approach. Management may feel that its job is handled by the statement that 'unsafe practices will not be tolerated.' Some companies look on safety as a public relations policy (a few believe that a plant safety program ranks along with factory picnics—devices to build good will) . . . "

H. G. DYKTOR, Michigan Department of Health, Bureau of Industrial Hygiene, is the author of "Preventive Measures against Oil Dermatitis," a booklet for the use of non-medical personnel, giving instructions for washing facilities and routines, and recommending the use of a germicidal agent, such as phenol, in the oil, and the use of non-irritating, easily removable ointments.

MICHIGAN'S Industrial Commission is taking measures "to the end that industrial plants no longer wait 25 years for their first inspections; that child-labor laws are rigidly enforced; that the waiting time for hearings on workmen's compensation claims and appeals is cut to the minimum; that rehabilitation possibilities for permanently injured workers are explored to the utmost."

PHYSICAL defects are of two types, static and dynamic. The loss of a finger, a stiff joint, the paralysis of one muscle or muscle group, are stationary defects and rarely affect the individual's capacity to work. Tuberculosis, arthritis, and similar systemic diseases are dynamic in that they affect the whole body and impair working efficiency. Rejection should be based on the presence of diseased states and not in static defects, except where job analysis in a specific vocation indicates unusual physical requirements.

—DR. H. H. KESSLER, Director, New Jersey State Rehabilitation Commission, at the 1941 Annual Meeting, Industrial Hygiene Foundation.

Will your Hospital Equipment

and First Aid Services

★ Keep Production Rolling? ★

ARE YOUR STERILIZERS UP-TO-DATE? HAVE THEY AMPLE CAPACITY FOR TODAY'S JOB? ARE THEY EFFICIENT? COMPLETELY SAFE? HOW ABOUT OPERATING LIGHTS? A REALLY GOOD LIGHT SPEEDS THE DOCTOR'S WORK.

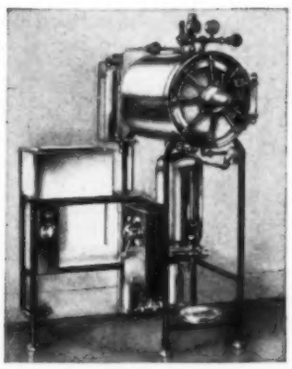
CASTLE 669 ***(Illustrated above with water sterilizer)***

Has 8″ x 16″ autoclave with CAST-IN-BRONZE construction. Entire body, ends and base cast in one piece of lifetime bronze. Recessed 16″ CAST-IN-BRONZE Instrument Sterilizer with silent oil-check foot lift. 9″ x 20″ black porcelain finished table top. Spacious double cabinet with plate glass doors and shelves. "Full-Automatic" throughout.

CASUALTIES on the production line today can be as costly as casualties in the field.

The responsibility of preventing any production let-down is in your hands. With plant personnel doubled or tripled, your present equipment may not be adequate for the job. Under any conditions, the chances are that you have a definite need for Castle Industrial Sterilizing Equipment and for Castle Lights.

Wire us the approximate number of cases handled daily by your First Aid Department. Let us recommend adequate equipment. We can make good deliveries on high priority orders.



Castle Sterilizers range in size from the smallest portable electric 16″ boiler to a battery for a city hospital. Standardized unit for various size plants are available.

CASTLE LIGHTS

Castle No.1 Spotlight provides ample, cool, color-corrected, glareless, shadow-free light wherever it is needed most. Although operator's head may be held directly in front of light, a complete spot of illumination will still be projected. Unexcelled for locating foreign bodies in the eye. Completely adjustable, on tripod caster base or wall mounting. Other Castle Lights include Major Operating Lights, Lights for Improved Over-All Illumination and Emergency Power Units.

CASTLE 1150

Combines 16″ x 20″ Pressure Dressing and Utensil Sterilizer, 3 gal. Pressure Water Sterilizer, 3 qt. Water Still, and 17″ Instrument Sterilizer with foot pedal lift. Affords full hospital sterilization in one compact, efficient unit.

WILMOT CASTLE COMPANY

1161 University Avenue, Rochester, N. Y.

INDUSTRIAL MEDICAL DEPARTMENTS — throughout the country are finding valuable assistance in our extensive facilities and wide experience. Consult us — we are at your service.

Complete equipment, portable or built-in, for efficient EXAMINING, TREATMENT, RECEPTION and REST ROOMS

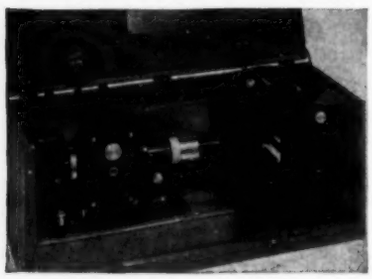
Stretchers, Wheel Chairs and Carts
Diagnostic and Surgical Instruments
Sterilizing and Laboratory Equipment
Suction, Pressure and Anesthesia Apparatus
Instrument, Treatment and Supply Cabinets
Beds and Cots
Therapeutic Lamps
Hydrotherapy Baths
Fracture Appliances
Inhalators, Resuscitators

Write for your copy of our comprehensive catalog

HOSPITAL EQUIPMENT CORPORATION
95 Madison Avenue, NEW YORK CITY
DALLAS, TEX. ● CHICAGO, ILL. ● PITTSBURGH, PA.

When the "Boss Heart" goes bad

THE employer may assume responsibility for the health of manual workers. But it must not be forgotten, however, that absence among the executive group can prove even more costly to a business. Many progressive companies recognize this and provide a routine periodic physical examination of all their employees. Such an examination cannot be considered complete without an electrocardiogram.



THE "SIMPLI-TROL" PORTABLE MODEL *is contained in one case 8" x 10" x 19" and weighs but 30 pounds. Mobile and Stationary models also available for Hospital and Clinical use. Any model may be arranged to record heart sounds and pulse simultaneously with the electrocardiogram. Send for literature.*

It is significant to note the predominance of **Cambridge-built** Electrocardiographs used for this purpose. The accuracy of **Cambridge** Records, the simplicity of operation, its dependability and longevity makes **Cambridge** the universal choice of doctors who use Electrocardiographs constantly, hence know them thoroughly.

The accelerated tempo of today's business calls for even closer attention to the vascular condition of the hearts of executives and workers alike. The routine check-up with a **Cambridge-built** Electrocardiograph is an important step in preventive therapy.

CAMBRIDGE INSTRUMENT CO., INC.
3734 Grand Central Terminal, New York
Pioneer Manufacturers of the Electrocardiograph

CAMBRIDGE
all-electric
ELECTROCARDIOGRAPH

DERMATITIS from cutting oils, at a Wright Aeronautical plant in Paterson, New Jersey, studied by the Dermatoses Investigation Section, Division of Industrial Health, National Institute of Health, disclosed the first reported and confirmed instance where cutting oils have caused not only an ordinary form of cutting oil dermatitis but chloracne as well. A number of the workers were found to have an eruption of the face resembling chloracne from Halowax. It was found that two of the oils used contained chlorine compounds.

—*Industrial Hygiene*, March, 1942.

LABOR has opposed physical examinations because (1) older workers are made to come under certain specific regulations; (2) until such time as labor can be properly protected, it can see no real benefits from these examinations; (3) as long as industry profits by such a program, labor cannot agree to it. There is not, however, any opposition to examinations on a voluntary basis, such as periodic examinations in many instances throughout industry.

—ROBERT J. WATT, International Representative, A.F.L., at the 1941 Annual meeting, Industrial Hygiene Foundation.

FEDERAL workers are to have an industrial health service to reduce sick leaves which have been costing government agencies $100,000,000 a year, according to plans being developed by the U.S.P.H.S. through the Division of Industrial Hygiene. Emphasis will be on prevention and discovery of disease, through health education programs, sick absenteeism studies, removal of health hazards, and first aid and treatment for minor ailments. Treatment and cure for more serious conditions will be left to the private physician.

—*Industrial Hygiene*, March, 1942.

THE all-out program of production requires the employment of all labor in accordance with those practices which will result in the maximum continued output of every individual. The sole test of labor standards must be the effect on the efficiency of the individual to insure

Harmony

IN THE KEY OF B_1

♪ Tune up your prescription with "Lixa-Beta - q. s." When you want to combine vitamin B_1 therapy with specific medication, Lixa-Beta will prove a delightfully palatable vehicle that contains 1600 U. S. P. Units of vitamin B_1 to the fluidounce. It provides a "common carrier" for most drugs, both soluble and insoluble as well as aqueous and oily substances. Why not give it a trial in your next prescription?

If you would like to obtain a complimentary supply and a list of drugs compatible with Lixa-Beta, please write a request on your letterhead to the Department of Professional Service.

Lixa-Beta is supplied in 8 ounce, pint and gallon bottles.

William R. Warner & Co., Inc., 113 West 18th Street, New York City

COOL GLARELESS LIGHT
for your eye work
HERE is a light especially designed to help you in all surgical attention to the eye, ear, nose and throat.
Consuming only 4 watts, the Pelton Localite projects a full 300 foot-candles into your operating field. Yet the Localite beam is cool, shadowless and free from glare.
You see this beam only where it meets its object. Your patient may not see it at all, even when looking straight into it. You operate swiftly and confidently.
Just see this Pelton Localite at your dealer's. Or write direct to us.
THE PELTON & CRANE CO.
Established 1900
DETROIT, MICHIGAN
EASILY portable; adjustable in any direction. Upright rod raises light center up to 80" from floor, if desired. Base, 13" diameter, conceals transformer in 110-volt, 60 cycle model; for other frequencies, or for DC, transformer or rheostat is mounted outside. Rubber feet. Base and light head finished in long wearing crystalline black; extension, arm and trim, polished chrome.
PELTON LOCALITE

top war production. Based on the test, the state laws and regulations embracing the following basic principles should be preserved except where modification may be necessary during the war period to assure maximum production: (1) A maximum 48-hour week, since weekly hours in excess of this standard have been demonstrated to result in decreased rather than increased production when continued for any extended period of time. (2) An eight-hour day, or the daily hours customarily worked in the particular establishment, industry, or community. (3) One-day-of-rest-in-seven, because experience has shown that this interlude has a revitalizing effect on the worker and a consequent beneficial effect on the total output. (4) Adaptation of the hours of labor and working conditions to the age and sex of the worker and the nature of occupation. (5) Provision for adequate meal and rest periods from continuous work in order to preserve health and efficiency. (6) Proper safeguards for health and safety go hand in hand with production efficiency and, therefore, greater care must be exercised in making plant conditions safe and healthful. (7) Wage rates for women should be the same as for men, including the entrance rate. These standards must be relaxed if necessary for total production."

—*Labor Standards*, January-February, 1942.

EDITORIAL in *Chicago Tribune*, March 30, 1942: ". . . all the factories in the country number 184,230. Of these, more than half employ fewer than 21 persons. If we call 100 employees the dividing line between little and big factories, we find that . . . . the little factories employ about one-third of all factory workers."

U. S. DEPARTMENT of Labor's Children's Bureau declares occupations involving exposure to radioactive substances hazardous for minors under 18.

A WORKMAN with a contact dermatitis caused by anything in his work should get the same compensation as one that has suffered an injury. In fact, a contact dermatitis usually connotes an increased sensitivity to the offending substance and frequently the man is unable to continue in his work, so loses his job or has to be transferred to other work where he does not come in contact with the offending substance. Contact or occupational dermatitis can be caused by an endless number of substances; some of which are primary irritants and cause an immediate irritation and some only after working in them for weeks and months. In Minnesota, we dermatologists almost never get a case that is covered by the (Workmen's Compensation) law. Included in the law are the following substances that might cause a dermatological condition: lead, mercury or phosphorus poisoning or their sequelæ, arsenic, wood alcohol, nitro and amido derivatives of benzine, carbon bisulphide, nitrous fumes, nickel carbonyl, tetrachlormethane or any substance used as a solvent for acetate of cellulose, African boxwood, chrome ulceration, cancer or ulceration of the skin due to tar, pitch, bitumen, mineral oil in paraffin or any compound, product, residue of any of these substances."

—S. E. SWEITZER, M.D., "Industrial Health" page, *Minnesota Medicine*, March, 1942.

GENERAL MOTORS' thirty-third annual report December 31, 1941, has the following on "Safety and Health Protection": "The Corporation's program for the safety and health of its employees was carried to a new degree of effectiveness in 1941. Approximately $6,000,000 was expended for safety and health protection during the year. In spite of new and unfamiliar tasks occasioned by the production of war materials, the number of days lost due to accidents in the plants, in relation to the number of hours of work, was the lowest in the Corporation's history. Time lost off the job from any cause usually means time lost on vital production which cannot be made up. For this reason the safety and health program to protect em-

HYDROSULPHOSOL

INDUSTRY'S NEW WEAPON

Against Burn Injuries

HYDROSULPHOSOL SPRAY TREATMENT FOR BURNS
SPRAY 50-50 DILUTION of HYDROSULPHOSOL and DISTILLED WATER as Follows:
Add DISTILLED WATER to Line on SPRAY Bottle, FILL with HYDROSULPHOSOL and Shake.
SPRAY FREELY on All BURNED AREAS.
Continue SPRAY applications every 15 minutes. After each SPRAY application DRIES, bandage may be used if applied LOOSELY.
OTHERWISE FOLLOW USUAL FIRST-AID ROUTINE.
E. C. LIENTZ & CO., Inc.
Los Angeles, California
DISTILLED WATER
HYDROSULPHOSOL
CONTAINS SULFHYDRYL (Bakaya) PENTATHIONATE (ion) in compounds of polysulfides and thiosulphates in aqueous solution.
COTTIE-WILSON LABORATORIES
LOS ANGELES CALIFORNIA

For Chemical and Thermal Burns

Now Available in Convenient

FIRST AID KIT

Durable all metal box, with contents securely held. Ready for instant use. Size 3"x 6"x 7".

WRITE FOR QUANTITY PRICES

HYDROSULPHOSOL'S outstanding ability to reduce lost man-hours, disabilities, and disfigurements due to burns is indicated by published clinical research. "There has been no evidence of infection in any of the cases studied so far," says a recent article, "or any evidence of toxicity. The solution is sufficiently bland that in diluted form it can be employed to advantage in burns of the eye."

AVAILABLE ALSO as HYDROSULPHOSOL OINTMENT in 1 lb. jars for follow-through treatment.

E. C. LIENTZ & CO., INC. 1006 West Sixth St., Los Angeles, Calif.
Representing Cottie-Wilson Laboratories

SEE PAGE 153

The use of Gadoment by Aldrich has been successful not only in burns, in which it is now of proven therapeutic value, but also in the following surgical conditions:

★ *Varicose ulcers*
★ *Decubitus ulcers*
★ *Abrasions*
★ *Skin grafting*
★ *Infected pruritus ani*
★ *Pruritus vaginae*
Ano-rectal wounds

Other authorities have also reported success with Gadoment in diabetic ulcers, wound healing, friction "burns" and various skin conditions.

GADOMENT
(Patch)

is a bland, cod liver oil ointment with which an even spread can be obtained. Promotes healing. Does not seep through the recommended dressing.

Send for copy of "Common Skin Lesions" and trial tube of Gadoment.

THE E. L. PATCH COMPANY
BOSTON, MASS.

ployees while at work takes on increased importance. Factors contributing to the organization's record were the safety and industrial hygiene organizations developed throughout the plants, mechanical safeguards on machinery, good industrial housekeeping, the interest of management and the safety and health consciousness of the employees themselves."

THE Harvard School of Public Health will again give a course in Industrial Hygiene, from April 27 to August 1, 1942, which is open to physicians and engineers who desire training in this field. The course will be essentially the same as that given during the past year to three groups of Navy Medical and Engineering officers and the schedule will be similar. Credit toward a graduate degree in public health or engineering will be given those who successfully complete the work. The tuition charge for the course is $200.00. The course will probably be repeated during the first three months of the next academic year.

REMEMBER the 53rd Annual Meeting of the AMERICAN ASSOCIATION OF RAILWAY SURGEONS, Palmer House, Chicago, September 10-12, 1942.

MANUFACTURERS

NUTRITION Research Laboratories announce Pendron, the Complete Vitamin Arch. Pendron is a multiple vitamin product, containing eight essential vitamins—A, D, B_1, B_2, B_6, C, Niacin Amide and Pantothenate Calcium. It is being introduced to the medical profession by full-page advertisements in 13 leading medical journals plus direct mailings to 145,000 physicians. It will be available April 1, 1942. Each Pendron capsule furnishes the known essential vitamins in amounts which are recognized by the medical profession and governmental agencies as the minimum daily requirements for optimum nutrition. Pendron is indicated in such conditions as anorexia, convalescence, anemia, pregnancy, under-nourishment and such restricted diets as reducing and ulcer diets.

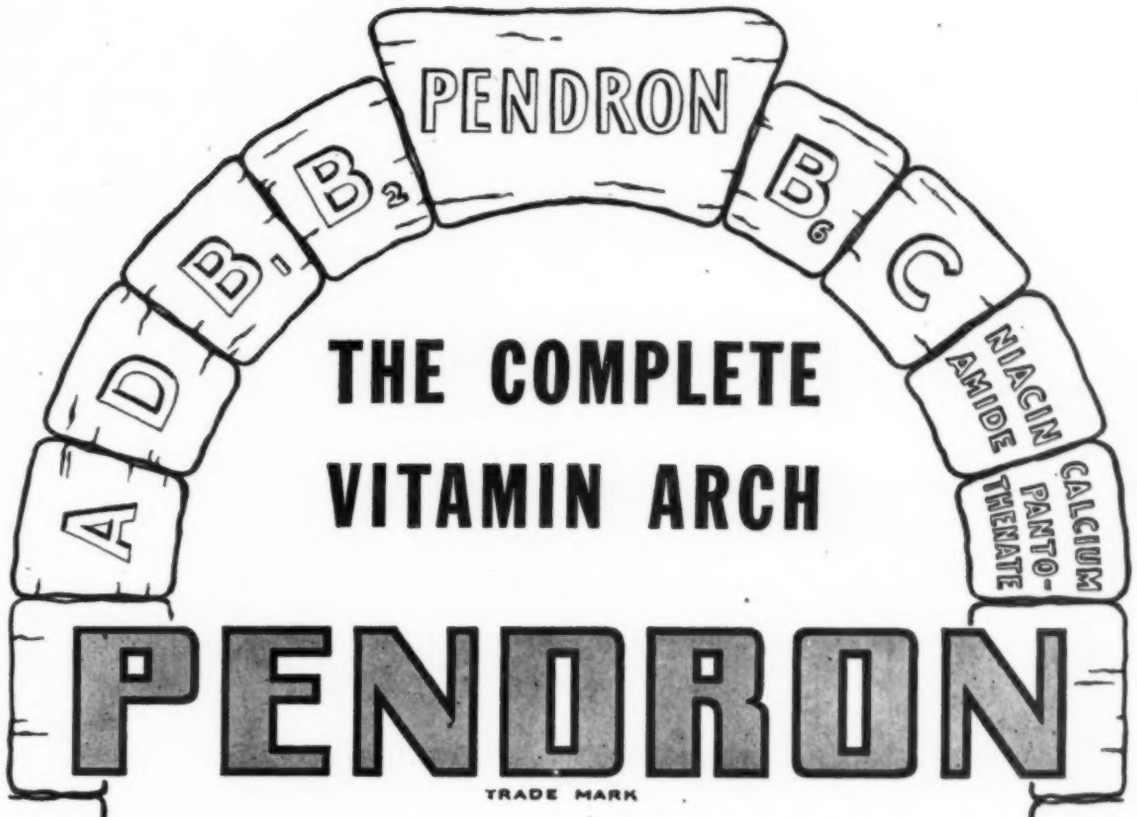
THE established wide acceptance of ERTRON, activated ergosterol (Whittier Process) by the medical profession, together with the new, modern laboratory and greatly increased production facilities enables Nutrition Research Laboratories to announce a very substantial reduction in the price of ERTRON. Effective immediately, the retail prescription price of ERTRON is $8.00 per bottle of 100 capsules and $4.50 per bottle of 50 capsules.

Sulfanilamide Dusting Powder

A HANDY dressing-table plastic container holding one-half ounce of sulfanilamide U.S.P. powder is manufactured by Flint, Eaton & Company, Decatur, Illinois. This package is more handy than the ordinary one in that the powder may be forced out by squeezing the sides instead of shaking the whole package as is usual. This is of particular advantage, because sulfanilamide powder is inclined to be cohesive.

Biotose (Ciba)

CIBA PHARMACEUTICAL PRODUCTS, Inc., of Summit, New Jersey, took the daily requirements of the B Complex as decided by the Food and Nutrition Committee of the National Research Council as a criterion for their new product, BIOTOSE. Each capsule contains thiamin hydrochloride 0.3 mg.; riboflavin 0.425 mg.; nicotinic acid 3.0 mg.; pyridoxine 0.1 mg.; ascorbic acid 12.0 mg.; phytine 0.1 gm.; pantothenic acid 0.28 mg.; and liver extract (20:1) 0.5 gm. Ciba believes that BIOTOSE fits in with the generally accepted idea of a nutritional tonic; many of the complaints related by patients are subtle, unrecognized manifestations of vitamin B Complex deficiency; the symptoms caused by deficiencies of the B Complex constitute the greatest medical problem in the vitamin field.



THE COMPLETE VITAMIN ARCH

PENDRON

TRADE MARK

Each PENDRON capsule furnishes the known essential Vitamins in amounts which are recognized by the medical profession and governmental agencies as the minimum daily requirement for optimum nutrition.

Each capsule of Pendron contains:

Vitamin A (Fish Liver Oil)	4,000 U.S.P. Units
Vitamin D (Activated Ergosterol-Whittier Process)	1,000 U.S.P. Units
Vitamin B_1 (Thiamine Hydrochloride) 333 U.S.P. Units	1 milligram
Vitamin B_2 (Riboflavin, Vitamin G) 800 S-B Units	2 milligrams
Vitamin B_6 (Pyridoxine Hydrochloride)	1 milligram
Vitamin C (Ascorbic Acid) 600 U.S.P. Units	30 milligrams
Niacin Amide (Nicotinamide, Pellagra-Preventive Factor)	20 milligrams
Pantothenate Calcium (Filtrate Factor)	1 milligram

Available in bottles of 30 capsules.

With PENDRON the physician can effectively prevent and treat the frank and sub-clinical multiple deficiencies known to affect a large percentage of our population.

Dose: Prophylactic—One capsule daily
Therapeutic—As directed by physician

PENDRON is made only in the distinctive two-color gelatin capsule. Potency and stability are guaranteed by rigid control methods of manufacture.

PENDRON is manufactured by the makers of ERTRON and BEZON.

Products of Nutrition Research Laboratories are promoted only through the medical profession.

NUTRITION RESEARCH LABORATORIES

4210 Peterson Avenue, Chicago, Illinois

YOU'LL HAVE A NEW CONCEPT OF HEAT THERAPY

• • • once you know the possibilities with a G-E Inductotherm, for here is what it does:

It brings about heating of the tissues ***from within*** *by* ***electromagnetic induction****—in contradistinction to the conventional methods of "driving" a high-frequency current through the skin and intervening tissues to reach the underlying tissues.*

It induces heat dominantly in the vascular tissues, where nature herself generates it to bring about and maintain an active hyperemia.

It is remarkably simple and convenient to use, with an easy-to-apply cable-electrode readily conformable to the part under treatment, thus assuring the desired distribution of energy into the tissues.

It makes heat therapy pleasant for the patient, with the sensation of a deep-down, comfortable heat that seemingly "comes from nowhere."

Yours for the asking—a file of interesting, authentic clinical reports evaluating this form of therapeutic heat; also a fact-filled booklet describing in detail the G-E Inductotherm—the instrument which introduced this highly efficient method of short-wave diathermy to the profession. Ask for Literature No. D15.

GENERAL ELECTRIC X-RAY CORPORATION

2012 JACKSON BOULEVARD CHICAGO, ILLINOIS

This magazine is published to promote sound thought upon and concerning industrial medicine and traumatic surgery. To that end it will contain articles, news items, reports, digests, and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The editors will exercise care in checking on the accuracy of data printed, but in all other respects articles and opinions of which expression is allowed are the opinions of their authors—the editors reserving in all cases the right to comment on the same, in the current or any subsequent issues, as they may be inclined.

The Journal of Occupational Diseases and Traumatic Surgery

With which are consolidated "The Industrial Doctor" and "International Journal of Medicine and Surgery."

The Science, the Law and the Economics of Industrial Health

Volume 11 April, 1942 Number 4

Hypertension in Workers over Forty Years of Age

—A Preliminary Report—

ARTHUR M. MASTER, M.D., *and* SIMON DACK, M.D.,
New York City

THE blood pressure in workers 40 years of age and over has not been studied sufficiently. Although it has been recognized for many years that the blood pressure rises steadily with age, only a relatively small number of blood pressure readings in the older age groups has been available. Many blood pressures of students, soldiers and workmen have been published, but the age of these groups generally ranged between 20 and 40 years. These studies have been cited in a previous paper.[1] One of the largest groups was that studied by Britten and Thompson[2] who found that in 2638 male workers over 40 the systolic pressure was 150 mm. or more in 16% in the decade 40-49 years, 28.6% in the decade 50-59 years, and 51.2% in those 60 years or over.

In the previous paper referred to above[1] we plotted the incidence of hypertension in the general population as calculated from 42,000 published figures. It was shown that the incidence of hypertension (150/90 or more) rose from 5% at the age of 25 to 45% above 65 years. Although the number of cases in the age group 40 years or over was relatively small, we intimated that hypertension in the general population was more frequent than was ordinarily appreciated. This was emphasized by Robinson and Bruger[3] who concluded from a study of approximately 4600 persons 40 years or over that about 40% of the adult population is prehypertensive or hypertensive. In this report and in others in preparation[4] we are presenting an analysis of the blood pressure in the general population 40 years of age or over as based on readings obtained in workers in industry, hospital patients, and inmates of homes for the aged.

Knowledge of the true incidence of hypertension in the general population is of fundamental importance in the study of arteriosclerosis, hypertension and the aging process. Its importance is enhanced when one remembers that the nation's population over 40 is increasing yearly by the millions. Dublin[5] has calculated that, in the year 1940, 6.8% of the population was 65 years of age or over, comprising nearly 9,000,000 persons, and 26.5% was 45 years of age or over. He estimates that in 1980 the corresponding percentages would be 14.4 and 40.37, or 22,000,000 persons over 65 years of age and about 61,500,000 persons 45 years of age or over. Stieglitz[6], too, has emphasized the same facts, i.e., that 40% of population in 1980 will be over the age of 45. The interest of the clinician and the physician in industry in the incidence of hypertension in people over 40 lies further in the fact that in the present war emergency many more men and women of the older age groups will be employed than ever before, whereas hitherto they were probably discriminated against to some degree.

From the Mount Sinai Hospital, New York City.

Material

WITH the whole hearted cooperation of DR. R. D. MUDD, Medical Director, Chevrolet-Grey Iron Foundry, Saginaw, Michigan, a division of General Motors, of DR. G. H. GEHRMANN, Medical Director, E. I. Du Pont de Nemours & Co., Wilmington, Delaware, and of DR. EDWARD MCSWEENEY, Medical Director, New York Telephone Company, DR. MICHAEL LAKE, Medical Director, R. H. Macy & Co., New York, and DR. LOUIS HAUSMAN, of B. Altman Co., New York, we obtained blood pressure readings in 5453 workers, 40 years of age and over, comprising 3665 men and 1788 women.

In all cases the blood pressures were taken by physicians by the auscultatory method. The sudden diminution in intensity of the sounds (fourth phase) was taken as the diastolic pressure in about one-third to one-half the cases, while in the remaining the total disappearance of sound (fifth phase) was considered as the diastolic level. Since the majority of opinion favors the sudden loss of sound intensity as the correct diastolic blood pressure it will be seen that our diastolic figures are on the conservative side, i.e., in many cases they are lower than they should be. The medical directors took pains to reassure and calm the patient, and the average or final resting blood pressures were recorded. The blood pressure readings were those of applicants for jobs, those obtained during periodical examinations every half to two years, and in the case of the New York Telephone Company also at times of enforced retirement, i.e., age 65 for men and 55 for women. In this company, as probably in the others, any active employee or retired employee could have a voluntary examination any time he wanted.

In general the companies were liberal in their acceptance of employees, taking even young workers with

TABLE 1.
HYPERTENSION IN 5453 WORKERS OVER FORTY YEARS OF AGE

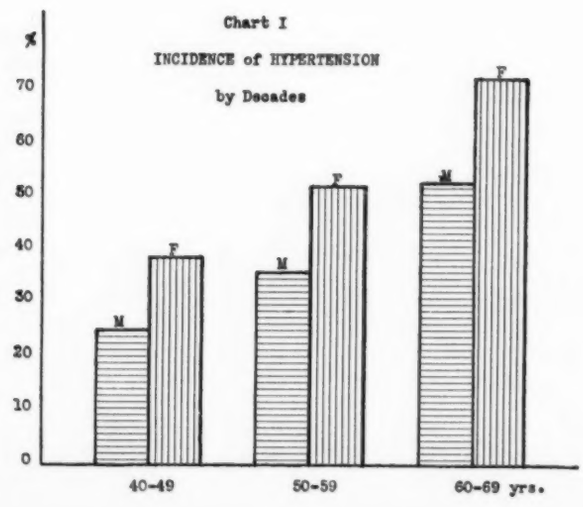
AGE GROUPS	NEW YORK TELEPHONE		CHEVROLET		DU PONT		MACY		ALTMAN		TOTAL	
MALE	No.	Hypertension	No.	Hypertension	No.	Hypertension	No.	Hypertension	No.	Hypertension	No.	Hypertension
40-49 yrs.	627	177 (28%)	467	114 (24%)	783	194 (24%)	331	68 (20%)	90	25 (27%)	2298	578 (25.2%)
50-59	194	99 (51%)	266	90 (34%)	309	99 (32%)	183	63 (34%)	66	26 (39%)	1018	377 (37.0%)
60-69	42	24 (57%)	67	33 (49%)	60	30 (50%)	92	48 (52%)	33	21 (64%)	294	156 (53.0%)
70-79	9	4	13	9	10	7	11	8	11	5	54	33 (61.1%)
80-89			1	1							1	1
	576		814		1162		617		200		3665	
FEMALE												
40-49 yrs.	714	353 (49%)	221	60 (27%)	7	1	302	61 (20%)	95	40 (42%)	1339	515 (38.3%)
50-59	116	79 (69%)	54	19 (35%)			125	54 (43%)	59	34 (57%)	354	186 (52.5%)
60-69	32	25 (78%)	10	4			26	20 (77%)	19	14 (74%)	87	63 (72.4%)
70-79	1	1	1	1			4	4	2	2	8	8
	663		286		7		457		175		1788	

systolic blood pressures of 150 to 180 mm. Hg. provided no other ailment was present. It is our impression that the blood pressure readings we have analyzed are characteristic of the blood pressures of workers all over the country. However, there is probably a tendency, particularly when unemployment is marked, to select the employees, i.e., to reject those with supposed or actual physical defects or hypertension. We thought that this was particularly true of Macy's since the percentage of hypertension ran so much lower than that of the other companies, particularly that of the New York Telephone Company, located in the same city as Macy's. As to the Du Pont workers, DR. GEHRMANN has taken special pains to point out to us that none in our series was exposed to any chemical fumes or to any conditions that might possibly lead to occupational diseases or alter the blood pressure. A good cross section of all types of workers, from executives and supervisors down to those engaged in strenuous work, such as mechanics, carpenters, drivers, linemen, maintenance men, and the sedentary group, such as telephone operators, clerical help and food handlers are included in this series.

In the analysis of the blood pressures, a reading of 150 mm. or more systolic or 90 mm. or more diastolic was classified as hypertension.

Results

THE results of our analysis are presented in Table 1. We have classified the 5453 employed persons according to sex and age and by decades 40-49, 50-59, 60-69 and 70-79 years. In men the incidence of hypertension, i.e., a blood pressure of 150/90 mm. or more, rose progressively from 25.7% in the fifth decade to 35.7% in the sixth decade, and to 52.8% in the seventh decade. In females, the corresponding figures were 39.1% in the fifth decade, 51.2% in the sixth, and 71.4% in the seventh. These figures are presented graphically in Chart I. It will be seen that one-fourth to two-fifths of workers in industry aged 40-49 years, and over one-third to one-half of those aged 50-59 years, have hypertension, the smaller percentage applying to men and the larger to women. In those 60 years or over more than half the workers have hypertension. These percentages are high, but those that we have already obtained in homes for aged[7] and in a general hospital[4] are even higher.



A more detailed breakdown of both the systolic and diastolic readings is being prepared and will be presented in a subsequent report.

Comment

WE HAVE presented our preliminary data on hypertension in workers 40 years of age and over. Our criteria for hypertension were a minimum of 150 mm. systolic and/or 90 mm. diastolic. These levels are those commonly chosen by clinicians and investigators. We believe that a systolic level of 150 mm. is sufficiently high to be classified as abnormal. Robinson and Bruger[3] accepted 140/90 as hypertension. Recent studies by life insurance companies[8] have shown that mortality rates over 30 years of age are closely correlated with systolic pressure, and that 145 mm. is probably abnormal. However, in this report we are not interested in mortality or morbidity rates but merely in the incidence of elevated blood pressure. We do not say that a blood pressure of 160/100 in a man of 50 is as good prognostically as 130/84. We are merely stating that at least one-fourth of male and two-fifths of female workers aged 40 to 49 years have a blood pressure of 150 systolic or 90 diastolic or more, and between 50 and 59 years the figures are at least one-third and one-half respectively. This high percentage of hypertension must cause us to change our conception of this condition. A slight or even moderate hypertension can no longer be considered abnormal in workers 40 to 50 years of age or over.

Hypertension does seem correlated definitely with aging, certainly, at least, a hypertension of 150/90 or thereabouts. However, we are not prepared to say now what limits to consider normal for each age group.

We feel that our figures are not too high but are representative of industry and the general population as a whole. First, although most of the medical directors took pains not to reject candidates for employment whose blood pressure was not very high, it seems reasonable that in certain cases or in certain firms when there were many more men and women applicants for work than there were jobs, the hypertension might

have been a cause for rejection. Since we probably did not receive all this data our percentages may be lower than otherwise. The fact that in a good number of the cases, perhaps the majority, the fifth phase and not the fourth was accepted as the true diastolic pressure also makes for conservatism in our results. We have mentioned that in almost all instances a sincere endeavor was made to put the patient at rest. Female physicians often took the readings on women workers. The blood pressure, too, usually represented an average or last figure, although we have evidence that even a single high or border line reading is significant.[4] Hines[9] also found this to be true, and the life insurance companies have known this for some time.[8,10]

It would certainly appear that mild or moderate hypertension if it is not beyond what one would now expect for the person's age should not be considered an abnormality, and certainly no cause in itself for rejection of a man or woman applying for work, nor should it be a reason for laying off an employee. Our conclusions should encourage both employer and employee. It may well be that after the age of 40 the old, now discarded, dictum that the blood pressure should be 100 plus the man's age is not entirely wrong. At least a blood pressure of this kind is normal for the age.

The appreciation that a large percentage of the people over 50 years of age normally have some degree of hypertension must be seriously considered by clinicians and research workers before hypertension is thought to be an etiological factor in any pathological process.

Conclusion

AN ANALYSIS of the blood pressure of nearly 5500 workers over 40 years of age is reported. In the 3665 males the incidence of hypertension (150 systolic or 90 diastolic or more) was 25.7% between 40-49 years, 35.7% between 50-59 years and 52.8% between 60-90 years. The respective incidences in the 1788 females were 40.2, 51.3 and 71.4. These percents are considerably higher than ever before published.

2. It is probable that at least this incidence of hypertension holds for the general population as a whole.

3. These figures show that hypertension is more common in women than in men, and that the incidence in both rises progressively with increasing age.

4. Hypertension within certain limits is a concomitant of the aging process. Since the span of life is increasing yearly it will be found that millions of people in the general population have some degree of hypertension.

5. Since hypertension is such a common finding over the age of 40 it should not be considered a sole cause of rejection for employment, unless the hypertension is marked. This should serve to reassure both industry and labor.

6. No attempt has been made to draw deductions from our figures concerning morbidity, mortality or longevity.

7. In the etiological correlation of hypertension with disease the presented facts must be taken into consideration.

Bibliography

1. MASTER, A. M., DACK, S., and JAFFE, H. L.: Age, Sex and Hypertension in Myocardial Infarction due to Coronary Artery Occlusion. *Arch. Int. Med.*, 64:767, 1939.

2. BRITTEN, R. H., and THOMPSON, L. R.: A Health Study of Ten Thousand Male Industrial Workers. *Pub. Health Bull.*, 162, June, 1926.

3. ROBINSON, S. C., and BRUGER, M.: Range of Normal Blood Pressure. A Statistical and Clinical Study of 11,383 Persons. *Arch. Int. Med.*, 64:409, 1939.

4. MASTER, A. M., and DACK, S.: Incidence of Hypertension in People 40 Years of Age and Older. *J. Mt. Sinai Hosp.* In Press.

5. DUBLIN, L. I.: Statistical and Social Implications in the Problem of Our Aging Population. Univ. Penna. Bicentennial Conference.

6. STIEGLITZ, E. J.: Aging as an Industrial Problem. *J.A.M.A.*, 116: 1383, 1941.

7. To be published.

8. Blood Pressure Study—1939. The Actuarial Society of America and the Association of Life Insurance Medical Directors, New York.

9. HINES, E. A., JR.: Range of Normal Blood Pressure and Subsequent Development of Hypertension. A Follow-up Study of 1522 Patients. *J.A.M.A.*, 115: 271, 1940.

10. MACKENZIE, L. F., and SHEPHERD, P.: The Significance of Past Hypertension in Applicants Later Presenting Normal Average Blood Pressure. *Proc. A. Life Insur. M. Dir. America*, 24:157, 1938.

Occupational and Compensable Disease

—With Special Reference to Tuberculosis—

LEOPOLD BRAHDY, M.D.,
New York City

THE development of occupational medicine and the extension of workmen's compensation laws have brought occupational disease problems before most physicians. Too often, when meeting medical problems with compensation aspects, physicians ask: What does the law say? They are surprised to learn that the law answers no medical questions. The following is written with the conviction that we shall more effectively advance occupational health and the administration of workmen's compensation if we are acquainted with certain phases of the law and with terms used in adjudication of compensation claims for injuries and occupational diseases. We should be able to distinguish between the medical aspects, which are the physician's concern, and the legal-administrative aspects of a problem. The latter are outside of the physician's province. He may, of course, suggest changes in the law or in the procedure where health matters are involved.

There are Federal compensation laws which cover employees in the District of Columbia, harbor workers, and employees of the United States Government. With the exception of Mississippi, all our states and territories have compensation laws, but no two of these laws are identical. Legal information on individual cases must be sought in the specific law of each state or territory.

Some general principles may become apparent if we group these laws according to similarities and differences. All these laws provide some medical care and sick pay during the period of disability. The employer may pay compensation directly or may be required to pay a premium to an insurance company which will then pay the compensation and medical costs. In most states the insurance rates are government controlled. They may vary with the hazards of each industry. Where 90% of the employees are clerks, the premiums are low because injuries are rare. Where the employees are house wreckers, among whom injuries are frequent and severe, the insurance premium may be equivalent to more than half the amount of wages paid. The amount of compensation payments, or of the premiums, is added to the price of the employer's product or service like any other business expense.

In no place are all workers within the scope of a compensation law. Most states exclude farm labor and domestic help. Some states include only specified industries. In many states the employer is not required to pay compensation unless he has a certain minimum number of employees. This minimum varies from two in Oklahoma to 16 in Alabama. In some states the minimum number clause does not apply to hazardous employments. In many states the law is not compulsory but its applicability is elective by the employer and the employee.

When we say that an injury is occupational we mean that it is the result of an accident which arose out of

and in the course of employment. An employee may meet with an accident but his employment may not be covered by the compensation law of his state. In such a case, even though the injury is occupational, he is not entitled to compensation. Whether an injury is occupational is a question of fact. That fact is contained in the answer to the following question: This employee met with such and such an accident while at work; is it probable that his injury resulted from that accident? Often the answer is self-evident; sometimes it is difficult. The question is always a *medical* one. A physician will give the same answer to that same question whether it is asked in Alaska or in Florida. Let us assume the answer is: "Yes, this injury is occupational." That answers the medical question and then the next question must be considered: Is the employee to be paid compensation by his employer for wages lost because of this injury? That question is usually phrased more briefly: Is this injury compensable? Whether it is compensable depends on whether it comes within the law of the state or territory that has jurisdiction. This is a *legal* question. The answer varies in different jurisdictions. When physicians differentiate between the terms, "occupational" and "compensable," they recognize a boundary separating their medical field from the legal-administrative field. Physicians—and only physicians—can decide whether a disease is occupational. Lawyers and administrators, but never physicians, must decide if an occupational injury is compensable according to the law of that state.

All compensation laws cover injuries and such diseases as are proximately caused by the injury. In any jurisdiction, if a physician testified that a compensable injury caused tuberculosis (and the authorities are satisfied that his testimony is correct), then the patient is paid compensation for wages lost because of the tuberculosis. A latent tuberculosis which is aggravated by an injury so as to disable the employee is compensable as part of the injury. The employee is paid because the disease is a result of the injury just as he is paid for an abscess developing at the site of a severe contusion. Physicians do not classify such a case of tuberculosis as an occupational disease and neither does any law. It is part of the compensable occupational *injury* and is therefore compensable.

States in Which Only Injuries are Compensable

MANY states have included only injuries among compensable conditions. They specifically exclude occupational diseases from the compensation law. The South Dakota compensation act reads: "Injury shall mean only injury by accident and shall not include a disease in any form except as it shall result from the injury." The Wyoming law reads: "Injury shall not include a disease except as it shall directly result from an injury received in employment."

The Compensation laws of 22 states and of Alaska contain a substantially similar clause. The states are:

1. Alabama
2. Arizona
3. Colorado
4. Florida
5. Georgia
6. Iowa
7. Kansas
8. Louisiana
9. Maine
10. Montana
11. Nevada
12. New Hampshire
13. New Mexico
14. Oklahoma
15. Oregon
16. South Carolina
17. South Dakota
18. Tennessee
19. Texas
20. Vermont
21. Virginia
22. Wyoming

In these states tuberculosis is compensable only when it results from a compensable injury.

States Scheduling Occupational Diseases

THE states with a schedule of compensable occupational diseases are:

1. Arkansas
2. Delaware
3. Idaho
4. Kentucky
5. Maryland
6. Michigan
7. Minnesota
8. Nebraska
9. New Jersey
10. North Carolina
11. Pennsylvania
12. Rhode Island
13. Utah
14. Washington

Also Puerto Rico

The laws of these states contain a limited list (usually called a schedule) of occupational diseases for which compensation must be paid if they disable the employee. The Rhode Island schedule contains the names of 31 diseases; Kentucky lists only the inhalation of noxious fumes and gases. The other states are intermediate. In none of these lists or schedules is tuberculosis mentioned. Therefore, tuberculosis acquired by a medical attendant because of contact with a patient is not compensable in any of these states. If tuberculosis is a complication of any of the scheduled (i.e., compensable) occupational diseases, and if it is proximately caused by that scheduled disease—then compensation must be paid for the tuberculosis. This is analogous to compensation for tuberculosis caused by a compensable injury.

Where All Occupational Diseases are Compensable

CALIFORNIA, Illinois, Indiana, Missouri, New York, North Dakota, Ohio and Wisconsin have "blanket coverage" for occupational diseases. The Federal, Hawaiian, and the Philippine compensation laws also have blanket coverage. This means that in addition to occupational injuries all occupational diseases are compensable under these laws. It is of interest to note that the major part of our industrial population is within these jurisdictions. Connecticut, which is usually classed as having "blanket coverage," and Massachusetts will be discussed later.

In these jurisdictions the decision as to whether the disease is compensable is based on the answer to the medical question: Did this disease originate in this patient's occupation? In these eight states, occupational tuberculosis in a hospital employee is compensable. The following are the clauses in state laws which make the term *"compensable* occupational diseases" include *all* occupational diseases.

1. *California:* A compensable disease is "any disease arising out of employment."

2. *Illinois:* " 'Occupational disease' means a disease arising out of and in the course of employment. Ordinary diseases of life to which the general public is exposed outside of the employment shall not be compensable, except where the said diseases follows as an incident of an occupational disease as defined in this section."

"A disease shall be deemed to arise out of the employment, only if there is apparent to the rational mind upon consideration of all the circumstances, a direct causal connection between the conditions under which the work is performed and the occupational disease. . . . and which can be fairly traced to the employment as the proximate cause, and which does not come from a hazard to which workmen would have been equally exposed outside of the employment. The disease must be incidental to the character of the business and not independent of the relation of employer and employee. The disease need not to have been foreseen or expected, but after its contraction it must appear to have had its origin in a risk connected with the employment and to have flowed from that source as a rational consequence."

3. *Indiana:* The occupational disease provisions are practically identical with those of Illinois.

4. *Missouri:* The compensation law is in two distinct parts—one is for injuries. The other is elective and covers all occupational diseases. None of the large hospitals has elected to carry compensation for occupational diseases and there has been no tuberculosis claim by a hospital employee.

5. *New York:* Compensation is to be paid for "any and all occupational diseases" arising out of and in the course of "any and all employments" covered by the act.

6. *North Dakota:* "The term 'injury' includes, in addition to any injury by accident, any disease proximately caused by the employment."

7. *Ohio:* Compensation is to be paid for all occupational diseases and the definition is given: "A disease peculiar to a particular industrial process, trade or occupation and to which an employee is not ordinarily subjected or exposed outside of or away from his employment."

8. *Wisconsin:* " 'Injury' is mental or physical harm to any employee caused by accident or disease." It is compensable "where the accident or disease causing injury arises out of his employment."

9. *Territory of Hawaii:* This law "applies to disease proximately caused by employment or resulting from the nature of the employment."

10. *Commonwealth of Philippines:* "Grounds for compensation—. . . any illness directly caused by such employment or the result of the nature of the employment."

11. *U. S. Longshoremen's and Harbor Workers' Act* (This applies also to employees of private employers in the District of Columbia): " 'Injury' means accidental injury . . . and such occupational disease or infection as arises naturally out of such employment."

In Massachusetts, the law has no list of occupational diseases nor is there any "blanket coverage" clause. The Massachusetts courts have held that the contracting of a communicable disease by reason of occupational contact is an accidental injury. The effect of this decision, so far as tuberculosis is concerned, is to make Massachusetts the only state without statutory "blanket coverage" in which tuberculosis in all hospital personnel is a compensable disease if shown to be occupational.

In Minnesota there is a clause which applies to state hospital employees only. It requires pre-employment examinations for tuberculosis. If tuberculosis of occupational origin subsequently develops, compensation must be paid.

Connecticut is usually classed among states that have blanket coverage, but there is a limitation in the Connecticut law which is rarely of consequence except in tuberculosis. The Connecticut law defines an occupational disease which is to be included in the law, as one "peculiar to the occupation in which the employee was engaged and due to causes in excess of the ordinary hazards of employment as such." The Connecticut Industrial Commission considers that tuberculosis in a hospital employee does not come within this definition.

An acceptable medical definition of occupational disease should not vary according to locality. What does vary is the law which defines which occupational diseases shall be compensable. Theoretically, in states with complete occupational disease coverage there would be compensation for all occupational diseases and for no others, if the administrators of the compensation laws are medically well advised. I say "theoretically" because these laws include diseases to which people are commonly exposed both in and outside of employment. Practically, in an individual case, it may be impossible for the medical adviser to distinguish between what is of occupational origin and what is the result of the normal hazards of living. As uncertainties are generally resolved in favor of an occupational claim, some non-occupational conditions may, at times, be called occupational. On the other hand, with the limitation applied in Connecticut, some occupational diseases will be excluded. These will be the few occupational diseases which may originate either in the occupation or outside of employment. Tuberculosis is one of them.

Silicosis

SILICOSIS is a compensable disease in Idaho, Maryland, Michigan, North Carolina, Pennsylvania, Utah and Washington. In West Virginia and Kentucky an employer may elect to have his employees covered for silicosis. In these states, in the jurisdictions with "blanket coverage," and in Massachusetts, compensation must be paid for tuberculosis if it is secondary to and caused by silicosis. Tuberculosis complicating other occupational diseases is not usual, but it is compensable if: (1) the underlying occupational disease is compensable, and (2) the tuberculosis is caused or activated by that occupational disease.

Precedent and Expert Opinion

IF A HIGHER court has made a decision on a question of law (for example, whether charitable institutions come under the compensation law), the lower courts usually accept this as a binding precedent and make similar decisions in all similar cases. The first decision acquires some of the characteristics of law. There is no such thing as precedent in medical testimony (or in any question of fact.) Let us assume that physicians considered a dermatitis arising under certain conditions of work as non-occupational and that a decision was rendered accordingly. Any time another claim arises and a physician has new or additional evidence or is of the opinion that the conclusions drawn in the preceding case are not warranted, hearings are held with reconsideration of all medical questions. Physicians can change the status of any disease from non-occupational to occupational (or vice versa), provided they have sound evidence and are willing to present it in specific cases before the proper authorities. For a physician to report a disease occupational or non-occupational "because the compensation authorities have previously made such a decision" is, in effect, an evasion of his own responsibilities. If the physician has no opinion on the etiology or is uncertain, he should so state, and defer to other physicians whom he accepts as authorities. A physician must never defer to legal decisions based on testimony with which he is not directly familiar or with which he is not in complete accord.

When is Tuberculosis a Compensable Disease?

COMPENSATION is payable for tuberculosis whenever it is:

1. Caused by an injury which in itself is compensable. This applies wherever there is a compensation law.

2. Caused by an occupational disease which in itself is compensable. This applies in states which have either "blanket coverage" or an occupational disease schedule and in Massachusetts.

3. Caused by occupational contact with tuberculosis patients or bacilli. This applies in federal jurisdiction and in states and territories which have "blanket coverage," and also in Massachusetts where "accidental injury" includes the contraction of communicable disease by occupational contact.

Ways by which Compensation Laws Change

BY EXTENSION of the law more occupational diseases may be included among compensable diseases. The law may be extended by judicial interpretation of the term "accidental injury" to include the infection of a communicable disease, as in Massachusetts. Such interpretation is not possible in the 22 states, and Alaska, which specifically exclude occupational disease. In any state the law may be extended by legislative action. Such legislative extensions have been made in various states and will probably continue to be made.

If, in any state, a disease known and stated by physicians to be occupational is not compensable that is so because of the state's legislation. If a disease is legally adjudicated as compensable, when, under the circumstances it is in fact not occupational, the fault lies with the medical testimony.

Legislative action to extend the compensation laws may take the form of (1) adding a schedule of occupational diseases where only injuries are now compensable; (2) amplifying and adding to an existing schedule; (3) adopting a general or "blanket coverage" clause for occupational diseases; (4) making the compensation law compulsory if now elective; (5) including employments now excluded.

The Law and the Physician

COMPENSATION laws have been a major factor in progress in the discovery, treatment and prevention of occupational disease. When physicians fail to recognize the occupational origin of a disease, its prevention is obviously impossible. What happens when a non-occupational disease is incorrectly classified as due to occupation on the basis of a physician's erroneous testimony? Though the effect may be less obvious, disease prevention is similarly made impossible. The erroneous classification establishes a fictitious origin and the industrial physician combats that chimera of occupational hazard while the ignored real cause continues to produce disease.

The whole structure of compensation law and occupational health rests on the medical data. Physicians should take an interest in these laws and their administration just as they do in other public health activities. Physicians especially are charged with the duty of discovering and formulating medical data and deciding on the relationship of disease and occupation. All compensation laws acknowledge that physicians are the sole authorities in this field. That supreme position will be maintained as long as physicians accept the responsibilities which go with it.

Bibliography:

U. S. Federal Employees Compensation Act.
U. S. Longshoremen's and Harbor Worker's Compensation Act.
Compensation Laws of the various states and of Hawaii, Puerto Rico, the Philippines, and Alaska.
BRAHDY L., and KAHN, S.: Trauma and Disease, 2nd ed. Lea & Febiger, Philadelphia, 1941.
DAWSON, M.: Problems of Workmen's Compensation Administration. Bul. 672, Bur. of Labor Statistics, U. S. Department of Labor, 1940.
DODD, W. F.: Administration of Workmen's Compensation. The Commonwealth Fund, New York, 1936.
MACK, M. G.: Medical and Legal Phases of Tuberculosis as an Occupational Disease and as an Accidental Injury. Nat. Tuberc. Assn., New York, 1938.
SAPPINGTON, C. O.: Medicolegal Phases of Occupational Diseases. Industrial Health Book Co., Chicago, 1939.
TELEKY, L.: The Compensation of Occupational Diseases. *J. Ind. Hyg. & Tox.*, 23:353, October, 1941.

The Cardiovascular System

—Relationship between Injuries and Diseases—

J. HAMILTON CRAWFORD, M.D.,
Professor of Clinical Medicine,
Long Island College of Medicine,
Brooklyn, New York

THE heart, being the most important part of the circulation, can be affected not only by direct injury which causes actual structural damage but may also have its proper functioning interfered with by an injury or strain which produces no organic damage to the heart itself.

That the heart is damaged may be perfectly obvious, as when the thoracic cavity is penetrated and the wound enters one of the cardiac chambers or a coronary artery is cut. In other instances the most detailed examination is necessary and a critical evaluation of all the facts essential before it can be decided whether the heart has been injured. The heart is protected by the thoracic cage; hence it is less liable to injury than the limbs or abdominal organs. Nevertheless, it is possible for damage to take place even in the absence of obvious injury to the chest wall. The literature on the subject consists mostly of isolated case reports in some of which the association with injury was not definitely proved. A few rather extensive surveys have been made.[1,2,3,4]

In analyzing the relation of trauma to the heart certain fundamental facts must be ascertained: (1) The condition of the patient prior to the injury. It is quite evident that if the heart is diseased, it is more liable to be injured than if it were normal. (2) The severity of injury is most important, and particularly the part of the body which has been damaged. (3) The type of injury must be studied in detail. Injuries such as a penetrating wound over the precordium or the steering wheel injury where the heart is compressed between the sternum and vertebrae would probably involve the heart. (4) The symptoms which were present at the time of the accident, whether of a cardiac nature or not. The symptoms which followed the accident and, most important of all, an accurate description of the time of appearance of those characteristic of heart damage. (5) A complete examination to find out whether the findings which were attributed to the accident had not pre-existed. (6) Where there is evidence of pre-existing heart disease, the question to be settled is whether this has been aggravated by the injury. (7) In the case of a claim that strain caused the cardiac damage or induced symptoms of heart disease, it is necessary to know exactly what work was being performed at the time of the supposed strain. Before attributing the state of the patient to strain it would seem essential to have evidence of some unusually severe activity outside the work which the individual performed in the ordinary course of his duties. If this were not a prerequisite anyone who developed heart symptoms while at work, no matter how severe the heart disease, would be entitled to compensation. (8) The make-up of the individual must be considered, as a nervous type is more liable under any circumstances to have numerous complaints. The possibility of malingering must also be taken into account. (9) The effects of extra-cardiac complications on the heart must be assessed. (10) The final result is often materially affected by the type of treatment which has been given, both at the time of the accident and thereafter. Undoubtedly proper skilled treatment can, in many instances, markedly reduce the period of disability.

There is no evidence that trauma can cause rheumatic, syphilitic, hypertensive or arterio-sclerotic heart disease. When these exist the problem to be decided is whether the condition has been aggravated by the trauma which had been sustained. White[2] states that hard, physical labor; strenuous athletic sports; repeated trauma of lesser degree, or mild poisoning have never been proved to be the cause of myocardial disease. I believe that most experienced cardiologists would subscribe to this. It may be argued that the so-called athlete's heart refutes this statement. There is, however, no proof that such an entity actually exists. One might also state that, excluding direct trauma to the heart, itself, the normal heart, except in rare instances, is not seriously permanently damaged by trauma.

It is now desirable to consider what injuries can occur to the heart and blood vessels as a result of trauma:

From the Department of Medicine, Long Island College of Medicine.

FUNCTIONAL DISORDERS: Unquestionably, trauma can induce congestive heart failure in a heart which was previously well compensated. However, if the heart failure is to be attributed to the accident or strain, it should appear either immediately or very shortly after the accident except in the case of the development of a rapid rate due to paroxysmal tachycardia, auricular fibrillation or auricular flutter, rupture of a valve or during the course of serious complications following the accident. It is possible also that very severe damage to the chest can induce acute cardiac dilatation and heart failure even in a normal heart. Here, of course, there would be only a very short time interval between the trauma and the development of symptoms. Angina pectoris, which is a disorder of function, will be considered under coronary artery disease.

DISORDERS OF RHYTHM: Premature contractions may appear after injury but are of little consequence because, as a rule, they have little significance. Supraventricular paroxysmal tachycardia may cause temporary embarrassment but the attack is usually of comparatively short duration or can be stopped by appropriate methods. Ventricular tachycardia is a very serious disorder and is frequently the precursor of venticular fibrillation which is the usual cause of sudden death. Auricular fibrillation or auricular flutter may be initiated by trauma and while the rate is rapid, may be followed by signs of cardiac decompensation. Frequently the attack ceases spontaneously a short time after the accident and in most instances normal rhythm can be restored if proper treatment is instituted shortly after the irregularity has commenced. In those cases in which normal rhythm cannot be restored the rate can be controlled so that adequate function is maintained although the heaviest forms of physical labor should be avoided. Heart block rarely follows trauma and a decision as to causal relationship, especially in older individuals, is greatly facilitated if an electrocardiogram had been taken shortly before the accident. The commonest cause of heart block is arterio-sclerosis of the coronary vessels. It must not be forgotten that in complete heart block an Adams-Stokes seizure may be the cause of the accident. Heart block due to trauma is caused by hemorrhage into the septum which damages the conduction tissue. The block may not be permanent, as it can be due to the reaction surrounding the area which is permanently damaged.

DAMAGE TO THE MYOCARDIUM: Penetrating wounds are so obvious as to require no further discussion. Fracture of the ribs or sternum may penetrate the myocardium and may even enter a heart chamber causing death from hemopericardium. Non-penetrating wounds or blows on the chest wall may cause myocardial damage. When extensive, the myocardium may rupture before the damaged area has been replaced by scar tissue or a ventricular aneurysm may develop subsequently. Compression of the heart between the sternum and the vertebrae may cause cardiac rupture or contusion of the myocardium. Evidence of some myocardial damage may be found even when there has been no external injury to the chest wall. Hemorrhage in the myocardium has been shown in rare instances to follow indirect strain on the heart as by sudden compression of the legs and abdomen. An extensive study of the reported cases due to non-penetrating chest injuries was made by Bright and Beck.[3] They found that when death took place it was due to cardiac rupture either immediately or following softening of the myocardium. With rupture, death either takes place at once or evidence of hemopericardium with falling arterial and rising venous pressures develop. The effect of trauma on the myocardium has been studied experimentally in animals in considerable detail by Schlomka[5] and by Bright and Beck.[3] Their results were essentially similar; namely, that the changes depended on the severity of the injury and consisted of disorders of rhythm; a fall of arterial pressure; a rise of venous pressure; a tic-tac quality of the heart sounds; dilatation of the heart, and changes in the electrocardiogram indicating myocardial damage, in some being suggestive of those seen after coronary occlusion. Most of the deviations from normal disappeared in about a month but some might persist. Bright and Beck,[3] after killing their animals, found that the myocardial damage was well repaired. They state that it was surprising the amount of trauma the myocardium could tolerate. Anyone who has done cardiac experimental work would agree fully with this statement. To show what the heart can stand without permanent functional impairment one has only to consider the Beck operation which is performed in humans for the relief of severe angina pectoris. In order to permit the formation of adhesions between the muscle graft and the myocardium, thus promoting a collateral blood supply, the surface of the myocardium is roughened by a dental burr and powdered bone is inserted into the pericardial cavity. Beck has performed several successful operations of this type with permanent benefit to the patients.

The signs of contusion of the myocardium in patients who have been injured are similar to those described in the experimental work. The symptoms and signs depend on the extent of the injury. Sometimes they may be marked and at other times the only evidence is electrocardiographic. One can agree with White and Glendy[2] in saying that a bruise of the heart muscle that is too slight to cause characteristic symptoms or signs, including x-ray and electrocardiographic anomalies, other than those of neuro-circulatory asthenia or cardiac neurosis, may be dismissed as wholly unimportant or as non-existent. Mild contusions heal without any evidence of functional impairment of the heart. Indeed, it is surprising how well the functional capacity is restored even after rather severe damage.

HEART VALVES: Instances of rupture of a normal heart valve following trauma are rare. As a general rule the heart valve which ruptures is diseased. Adam[6] in 1927 could find only 15 reports of ruptured normal valves following accident. The aortic valve is the one most commonly affected. The diagnosis is made by the appearance of a murmur which has not been present previously or the onset at the time of the accident or shortly thereafter of cardiac symptoms, accompanied by the signs of progressive enlargement of the chamber affected by regurgitation of the blood. When the mitral valve is involved rupture of the chordae tendinae is the usual damage. Stenotic lesions are never caused by trauma.

Acute bacterial endocarditis is usually found in septicemia and may follow an injury which has caused this condition. Subacute bacterial endocarditis starts insidiously and gradually progresses. In the early stages the patient is capable of working. The organism which causes it in most instances is the *Streptococcus viridans*. This organism is very uncommon in wound infections except those following tooth extraction. Unless the particular organism found in the blood culture can be cultured from the infected wound or is one likely to have contaminated the wound the discovery of sub-acute bacterial endocarditis at the time of the accident, or shortly thereafter, is most probably coincidental.

PERICARDIUM: Pericarditis may follow a penetrat-

ing wound or a blow to the chest. Simple pericarditis clears up without leaving any important sequelae. Suppurative pericarditis, on the other hand, is a very serious condition and is usually fatal. Hemopericardium follows wounds penetrating the heart chambers, hemorrhage from an injured coronary artery, or cardiac rupture. Unless the wound in the myocardium is rapidly closed, death takes place.

GREAT VESSELS: Penetrating wounds may puncture the aorta or pulmonary artery and are quickly fatal. Rupture of the normal aorta following non-penetrating blows on the chest is very rare but in the diseased aorta a dissecting aneurysm may follow such a blow. However, the fundamental cause of the condition is marked arterio-sclerosis with hypertension. The onset of dissecting aneurysm is usually accompanied by severe symptoms and these should appear at the time of the accident before an association can be established. Following an accident, an aortic aneurysm may rupture. The basic cause of the aneurysm is usually syphilis and the trauma provided only the last straw. Rupture of a saccular aneurysm is immediately fatal.

The pulmonary artery and great veins are seldom injured except by penetrating wounds.

CORONARY ARTERY DISEASE: This provides one of the most controversial subjects in the relation of trauma to heart disease and requires a most complete and thorough study of the history and the patient before a reasonably accurate opinion can be expressed.

ANGINA PECTORIS: This is a symptom complex usually caused by athero-sclerosis of the coronary vessels. The sclerotic vessels do not permit sufficient blood to be supplied to the heart for its needs when some strain is thrown upon it, thus anoxia of the myocardium is induced, giving rise to pain. In order to establish the diagnosis of angina pectoris it is esssential that the history correspond to that characteristic of this symptom complex. There are many causes of pain in the chest which have no relation to the heart and these must be carefully differentiated. There are thousands of people who are convinced, as a result of erroneous diagnosis, that they are suffering from serious heart disease when careful examination reveals that the heart is not affected in any way. Angina pectoris is a paroxysmal sensation of oppression in the thorax which may amount to severe pain usually situated under the sternum, frequently radiating to one or both arms, especially the left, brought on by effort, excitement or any other condition which throws a strain on the heart and disappearing very shortly after cessation of the cause which induced it. If this definition is adhered to, fewer mistakes in diagnosis will be made. Trauma commonly induces an attack in an individual who has been subject to them before and the attack may be very severe. Cases have been described in which the first attack followed an accident but in many of these symptoms do not conform to the above definition. In order to establish a causal relationship the attack should appear immediately after the injury. There is no evidence that trauma is followed by angina pectoris in an individual with normal coronary arteries. There is also no reason to believe that trauma plays any part in the production of the usual basic cause of angina pectoris; namely, athero-sclerosis. As a consequence of recent studies on the vascularization of blood vessels, it has been suggested that trauma may cause rupture of the capillaries in a diseased vessel wall, thus inducing intimial hemorrhage, which narrows the lumen of the vessel sufficiently to cause myocardial ischemia or rupture of a plaque, inducing thrombosis. There is no proof that intimial hemorrhage is due to increased coronary pressure, nor has it been shown that such has taken place after an accident. Experimentally the pressure in normal coronary arteries has been raised far above that ever attained in man without causing rupture of the capillaries. Although angina pectoris may first appear during some unusual effort there is no evidence at present that the latter plays any part in causing the underlying pathology.

CORONARY OCCLUSION: This disease has become increasingly prevalent, whether due to a greater incidence or to increased diagnostic acumen is uncertain. When an attack occurs at work, the question of the relationship to effort and trauma immediately is raised. There is no evidence that they can cause coronary occlusion in a normal vessel. The usual underlying cause is coronary athero-sclerosis. The blood supply may be shut off from the myocardium by a thrombus in the lumen of the vessel or by prolonged spasm. In the former along with the myocardial infarct a thrombus is present in the lumen of the vessel while in the latter no thrombus can be found. Master and his co-workers[7] analyzed 1620 cases of coronary occlusion as to their time of origin. They found that 52% came on during sleep or rest; 21% during mild routine activity; 15.5% while walking at an ordinary pace; 9% during moderate activity and 2% during unusual activity. This corresponds roughly to the experience of most cardiologists and almost all are agreed that unusual effort or trauma is not a common etiological factor in this disease. As the vast majority of cases occur at rest or during ordinary activity, it seems reasonable to require evidence of some unusual activity or strain before the duties the individual is performing can be considered a precipitating factor. When a man is doing the ordinary work to which he is accustomed and he is seized with an attack there seems no reason to attribute it to his employment. If this were done every one who developed coronary occlusion while at work should be compensated even if he were only sitting at a desk. However, if an individual while undertaking some severe strain to which he is unaccustomed develops a coronary occlusion, then it seems justifiable to conclude that the attack was precipitated by the unusual effort. Most probably the patient would have developed the condition within a short time without such a strain and it merely hastened matters. In order to establish a causal relationship the symptoms and signs should appear immediately or within a very short period. If such is not the case then there seems no reason to attribute the onset of the attack to trauma and it should be considered as due to natural causes. There is a common impression, which is quite erroneous, that once a coronary occlusion has taken place the individual is totally incapacitated for the rest of his life. After recovery it is undesirable for him to undertake heavy physical labor but there is no evidence that light work is harmful and it is possible for a large majority to undertake this successfully.

NEURO-CIRCULATORY ASTHENIA: The symptoms and signs of this disease are dyspnea on effort; sighing; dizziness and faintness; vague precordial pain unrelated to effort; moistness of the hands and feet; precordial tenderness; variations in heart rate, and vasomotor instability in general. The heart is found normal upon examination. The cause of the disease is unknown but is considered to be due either to an endocrine disturbance or to be of nervous origin, the sympathetic nervous system being principally involved. The condition has developed after an injury and must be carefully differentiated from organic heart damage. Except in very marked degree it is not usually incapacitating.

CARDIAC PSYCHONEUROSIS: This corresponds to psy-

choneurosis of any other system. The individual imagines that he is suffering from heart disease although he has none of the characteristic signs. It must not be forgotten, even when actual organic disease is present, that some of the symptoms may be on the basis of a psychoneurosis. In cardiac neurosis a detailed examination is essential in order to try to convince the patient that his beliefs are without foundation.

PERIPHERAL VASCULAR DISEASES: As in the case of injury to the heart and large blood vessels in the chest, when penetrating wounds are present the damage to the peripheral vessels may be obvious. However, lesser wounds or non-penetrating wounds may require the most careful study with the various measures utilized in the investigation of peripheral circulatory efficiency before the part played by trauma can be decided upon. Thorough study of the non-affected extremities is necessary to establish whether the patient is suffering from a generalized or a local condition. The same fundamental principles apply as in other cardiovascular problems.

A wound of one of the main arteries may lead to death from hemorrhage, unless the bleeding is stopped quickly. Gangrene may take place or a long period of invalidism may be necessary before an adequate collateral circulation is established.

TRAUMATIC ARTERITIS: This may follow an injury both penetrating and non-penetrating. Hemorrhage occurs in the wall of the vessel and thus narrows its lumen, causing inadequate blood supply to distal parts. In order to establish the diagnosis the condition should appear within two weeks of the accident; should not be progressive, and a similar condition should not be present in the uninjured extremities.

ARTERIO-VENOUS ANEURYSM: This may follow trauma and unless properly treated, may lead eventually to serious consequences. The characteristic signs of this condition are pulsation in the veins; obstruction of the venous return distal to the aneurysm; a loud roaring, continuous murmur, a palpable thrill over the aneurysm and, if the vessels involved are large, left ventricular enlargement with the eventual development of heart failure.

Arterio-sclerotic and luetic changes in the vessels of the extremities frequently impair the peripheral circulation. When marked, the collateral circulation may be just sufficient to maintain the requisite blood supply. Under such circumstances even small injuries may be sufficient to cause gangrene. Patients suffering from diabetes with arterio-sclerosis are, as is well known, most susceptible to trauma and even almost inconsequential injuries may lead to serious results. In all these conditions the signs should appear within at least two weeks for causal relationship to be established.

THROMBOSIS IN AN ARTERY: This may occur following injury and cause complete obstruction to the circulation of the area supplied by the vessel. Here there should be evidence of its appearance at the time of the injury or very shortly thereafter.

BUERGER'S DISEASE: This is not caused by trauma. Injury may aggravate it by causing spasm of the vessels; by injury to the collateral supply, or by the induction of massive thrombosis. In order to establish trauma as a cause for an aggravation of the signs of this disease it must be shown that Buerger's disease is present; that there had been an injury, and that within two weeks an increase in symptoms and signs confined to the injured extremity, has taken place.

PERIPHERAL VEINS: Phlebitis may be caused by injury and a thrombus may form in the affected vein. The principal danger is the possibility of pulmonary embolization.

In conclusion one may state that lesions of the cardiovascular system can follow trauma and that the association may be obvious, this being particularly true in penetrating wounds. With non-penetrating wounds, as a rule, greater difficulties present themselves. It is rare in such cases for a normal cardiovascular system to be seriously damaged. When there has been pre-existing disease the question arises of whether the accident aggravated the condition, and if so, to what extent. It is only by the most painstaking examination, utilizing all the methods at our disposal, and a critical examination of all the pertinent facts, that a proper and just decision can be made.

Bibliography:

1. KAHN, M. H. and KAHN, S.: *Ann. Int. Med.*, 2:1013, 1929.
2. WHITE, P. D., and GLENDY, R. E.: Trauma and Disease, BRAHDY and KAHN. Lea and Febiger, Philadelphia. Pp. 24-73, 1937.
3. BRIGHT, E. F., and BECK, C. S.: *Am. Heart J.*, 10:293, 1935.
4. BOAS, E. P.: *J.A.M.A.*, 112:1887, 1939; *Am. Heart J.*, 23:1, 1942.
5. SCHLOMKA, G.: *Ergebn. d. inn. Med. u. Kinderh.*, 47:1, 1934.
6. ADAM, A.: *Ztschr. f. Kreislaufforsch*, 19:313, 1927.
7. MASTER, A. M.; DACK, S., and JAFFE, H. L.: *Indust. Med.*, 9:359, 1940.

Cod Liver Oil Ointment in Surgery

—An Eight-Year Study—

R. H. ALDRICH, M.D.,
Boston, Massachusetts

IN RECENT months the literature has contained many articles advocating new forms of therapy to be used in wounds, ulcers, burns, and other surgical lesions. The mere number of these new substances is so great as to bring about confusion and to warrant a retrospective study concerning the use and effects of proved agents.

A 70% cod liver oil ointment* has been used in my own practice since 1934. The lesions treated with it have been varicose ulcers, decubitus ulcers, abrasions, minor burns, indolent burns, donor and recipient sites following skin grafting, burns of the face, especially those around the mouth and the eyes, and such surgical conditions as secondarily infected pruritus ani, pruritus vaginae, and ano-rectal wounds.

Review of the Literature

COD LIVER oil was introduced by Lohr[1] in 1934 as a wound dressing. Its acceptance and use was enthusiastic and widespread. Foreign publications have contained almost 200 articles advocating its use. Over 50 papers have been published in the American literature. Most of the articles report a fairly large series of cases.

A summary of the beneficial actions of cod liver oil or an ointment containing it has been made from the literature. Only those points on which the majority of writers agree have been listed. When these points are borne in mind, it is evident that they are the answers to a great many problems in wound healing.

Investigators[2] have shown that cod liver oil is of particular value in wound healing because:

1. It is sterile and bactericidal.
2. It destroys the staphylococcus and the streptococcus.
3. It acts as a definite stimulant on granulation tissue and epithelium.
4. It accelerates liquefaction of dead tissue.
5. It brings about a serum response that apparently benefits indolent wounds.

*The cod liver oil ointment (GADOMENT) used in this study is manufactured by The E. L. Patch Company, Boston, Massachusetts. It contains 70% cod liver oil, small quantities of carbolic acid, plus benzoin and zinc oxide, in a wax base.

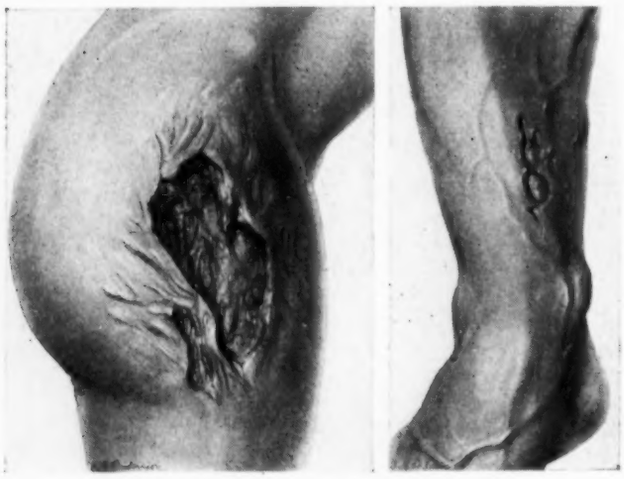
6. Its local application produces a beneficial generalized systemic response.
7. It increases the metabolic rate of leukocytes by over 400%.
8. It forms a protective non-irritating film over the wound.
9. It can be used on mobile surfaces of the body such as eyelids and mouth.
10. It eliminates most of the pain associated with daily dressings.
11. It reduces contractures and produces minimal scarring by bringing about rapid healing.

The method by which cod liver oil acts is not clearly understood. It was first thought that the vitamins A and D contained in the oil were the factors involved. Velupillay[26] in reporting cod liver oil dressings on leprous lesions was convinced that it was the vitamin A content that produced healing. However, the author has found that bland ointments containing added vitamins A and D do not have the same effect as cod liver oil itself. At the present time it is impossible to point to any fraction or combination of fractions as being responsible for the observed effects. It must be considered, until further work has been done, that the whole oil with all of its vitamins is necessary for the clinical improvements in wound healing.

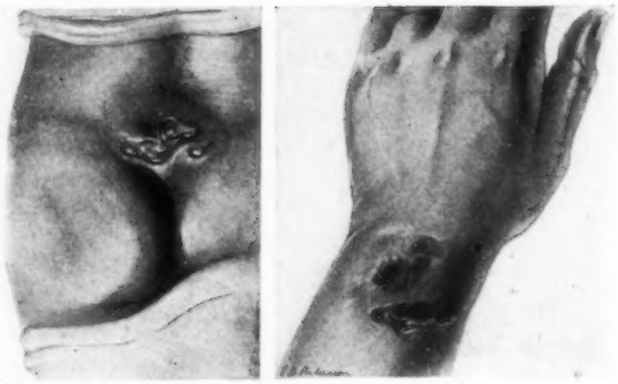
There is no wish on the part of the author to discredit any of the newer forms of treatment advocated for wound healing. They all have their uses and have been reported by outstanding surgeons. The majority of them, however, do not give the surgeon as many answers to as many problems as the cod liver oil ointment used in our cases. It is to illustrate the extreme flexibility of cod liver oil that we report its uses on some very common surgical lesions.

Indolent Burns

IT HAS been our experience in handling a relatively large series of burns that at some stage in the process of healing a period of indolence develops. Usually a large burn treated by one of the generally accepted methods heals rapidly for a time. This may be three weeks or even three months. The healing phase is then interrupted by a period of indolence. Certain areas, and they are unpredictable, fail to produce granulation tissue and epithelium. This indolent condition exists in spite of an otherwise normal patient. The blood picture can be kept normal, the vitamin intake may be extremely high, the patient may even be up and about, and he may have regained most of his strength, but still unhealed areas persist and present a fairly typical picture. The surface is pale and is usually covered with a yellowish-grey layer of fibrin. There is no granulation tissue present and the epithelium around the edges remains inert. It is not possible to skin graft such areas as the donor skin cannot get nourishment from the recipient site.



(LEFT)—INDOLENT BURNS present a real healing problem to the surgeon. A cod liver oil ointment is definitely indicated in this type of burn. The affected areas become pink and exuberant, and skin grafting can be done with the assurance of a good take.
(RIGHT)—In VARICOSE ULCERS the 70% cod liver oil ointment stimulated epithelium and granulation tissue growth and promoted patient comfort.



(LEFT)—DECUBITUS ULCERS are prone to remain indolent and need local stimulation to aid the body in restoring its normal pattern. Those ulcers treated with the cod liver oil ointment, in our study, filled in rapidly and, when the lesion leveled off, epithelium marched across the raw area.
(RIGHT)—MINOR BURNS present an important problem, with the increased industrial activity. The 70% cod liver oil ointment used in our study allayed pain, promoted healing, and in many cases made it possible for the worker to remain on his job.

Cod liver oil ointment used on these areas almost invariably stimulates the building up of granulation tissue and awakens epithelial growth around the edges. Usually after 10 days to two weeks of daily dressings the area can be prepared for skin grafting and a successful take obtained. These indolent areas present the need for stimulation, chemical debridement, an increase in the metabolic rate of leukocytes, and vascularization. Cod liver oil is apparently the substance to meet the requirements of this type of lesion.

Varicose Ulcers

VARICOSE ulcers are notoriously prone to remain completely inert with no apparent effort on the part of the body to produce healing. The blood supply to the ulcer is inadequate. There is usually a cicatricial layer of varying thickness at the base of the ulcer, moderate infection is present, and there is usually no evidence of epithelial ingrowth. These ulcers occasionally heal rapidly when the varicosity is corrected, but many times where the condition has existed for weeks or months, there is need for a definite stimulant to promote growth.

Cod liver oil ointment used as a daily dressing usually produces a characteristic response. The surface infection and the fibrin disappear after about five to seven days. The latter is apparently liquefied. The base of the ulcer takes on a pink color and minute raised areas of granulation tissue appear. The ulcer builds up from the bottom and as it approaches the level of the skin a fine white layer of epithelium spreads out across it. The epithelium thickens and the end result is a soft elastic scar tissue repair with sufficient circulation to prevent future re-appearance

of the ulcer. It is always necessary, of course, to correct the circulation of the affected part by adequate treatment of the varicosities.

Decubitus Ulcers

DECUBITUS ulcers present essentially the same problem as varicose ulcers. In the one case there is a limited blood supply due to the puddling of blood in the inadequate veins and in the other the blood supply is cut off by pressure. Usually decubitus ulcers appear in elderly patients whose general systemic response is at best very poor. This is especially true in decubitus ulcers that have become extremely chronic. If the weight of the patient can be kept off of the ulcer the response to a cod liver oil ointment takes the same course as the varicose ulcer. In large decubitus ulcers local application of the cod liver oil ointment seemed to produce a generalized systemic response. The general health of the patient became better. This may have been due to the healing of the ulcers, although in some cases it was so striking that clinically, at least, the 70% cod liver oil ointment would appear to be the deciding factor.

Burns of the Face

A FACE burn, because of the anatomy, has certain characteristics not found in other parts of the body. The skin of the face is extremely thin and contains more hair follicles and sweat glands than other parts of the body. The face also has orifices that bring about extreme contamination. Except for a joint surface, the skin of the face is the most mobile. These peculiar characteristics of the face make it essential that the form of treatment used in caring for a burn be one that fulfills special requirements. Obviously an eschar should not be produced on a burn of the mouth or eyelids. An eschar would be extremely uncomfortable and contamination under it would be a certainty. A face burn usually heals faster than a burn elsewhere because of the thousands of islands of epithelium at the bases of the hair follicles and sweat glands. In spite of the speed at which the body will heal a burned face, more speed is frequently necessary. The faster epithelium can cover the area the less chance there is for contractures to develop.

The cod liver oil ointment used in our studies stimulated both the granulation tissue and the epithelium. It was of particular interest to the author to note that the granulation tissue and epithelial healing processes synchronized their activity—thus minimizing the possibility of poor cosmetic results. The ointment formed a comfortable dressing for such a sensitive and mobile part and it reduced infection, resulting from contamination, to a minimum.

The ointment is applied to pieces of old linen causing them to adhere to the burned surfaces without bandaging. The removal of the linen is painless, and as it comes away it usually brings most of the infection with it. It does not adhere too firmly to the beard in male patients. The protective film in direct contact with the burned surface prevents air from drying out the burned nerve endings, thereby preventing or reducing pain.

Minor Burns

WITH the increased industrial activity there is certain to be a sharp rise in industrial accidents. A considerable number of these injuries will be minor burns.

The experience of the British leads us to believe that the casualties resulting from sabotage and bombings will also include a vast number of minor burns.

In minor burns the surgeon is faced with four problems:

1. Control of pain.
2. Asepsis and antisepsis.
3. Promotion of healing.
4. Getting the worker back on the job.

The 70% cod liver oil ointment, used in our study, controls pain by the occlusion of air and the mild anesthetic action of the carbolic acid present. The necessary dressings were not painful and did not adhere to the exposed raw surfaces.

While infection from small burns is not as great as in major burns, it is, however, obvious that marked disability can be caused as a result of a small portal of entry through the skin. The antiseptic qualities of the cod liver oil ointment used greatly reduces this possibility of infection.

The promotion of healing is very important, both from the standpoint of covering the affected surfaces with intact epithelium and getting the worker back to his job.

Since many minor burn victims are not sick or disabled enough to prevent them from working, it is important that the dressing applied must be one which not only gives comfort and protection, but must not hinder the patient's movements in carrying out his normal occupation. Large, bulky dressings are obviously out of the question, and ones that cause friction over the burned area are harmful. All methods of treatment that develop eschars should be avoided, especially over movable surfaces, as the eschar will either crack and allow infection to creep in or will act as a splint and prevent motion.

It was our experience that the cod liver oil ointment dressings promoted healing and allayed pain. Dressings were left on from 48 to 72 hours, then removed, and fresh ones applied. When the burned surface was inspected following the removal of the first dressing, it was observed that the wound contained no pus. There was a fine film of blood serum covering the denuded area. The serum offered a protective covering to the new regenerating cells and gave them an excellent medium in which to grow. The spread of new tissue was hastened and the bacterial growth inhibited.

Pruritus Ani and Pruritus Vaginae

THESE conditions, usually infectious in nature, are extremely prone to become chronic. There is a thickening of the epithelium due to irritation and scratching; infection persists because of the nature of the orifices and because of the many folds and crypts. Strong antiseptics cannot be used as they cause burning and further irritation. Cod liver oil ointment reduces irritation almost at once by filling in the irritated folds and covering the nerve endings. This reduces the desire to scratch and prevents further trauma. The mild antiseptic action of the oil destroys a certain percentage of the organisms and the factor of epithelial stimulation causes a healing process to set in. The hornified layer of epithelium is softened and sloughs off leaving normal skin and mucous membrane.

Post-Operative Anal and Perianal Dressings

POSTOPERATIVE dressings following hemorrhoidectomies, the excision of fistulae, fissures, and pilonidal sinuses often present a problem to the surgeon. Because of the position and the sensitivity of these areas, the dressing must be one that is painless. Dry gauze adheres to fresh external hemorrhoid incisions. The raw surfaces resulting from the excision of a pilonidal sinus causes pain and bleeding. Some oint-

ment or salve has to be used to prevent the sticking of the gauze to these areas. Infection is another factor. The perineum is always contaminated and although it seems to have a special immunity, nevertheless, an agent is required that will reduce the possibility of secondary organisms causing a flare-up of cellulitis or a more extensive infection.

Immediately following a hemorrhoidectomy for either external or internal hemorrhoids a gauze plug about one-half inch in diameter and four inches long can be made by smearing a sponge with the cod liver oil ointment. If this is inserted into the rectum with one end protruding it helps to control bleeding and aids in reducing infection and stimulating healing. Usually this plug can be removed after 24 hours.

If external hemorrhoids are present a piece of old linen or gauze, well covered with the cod liver oil ointment, can be applied directly to the suture lines and held in place by a "T" binder. Such a dressing makes the patient quite comfortable and speeds up the healing processes.

It is the general custom in the excision of pilonidal sinus to pack the wound with gauze saturated in some ointment. In the past, vaseline gauze has been used extensively. The author has found it more beneficial to use gauze saturated with the 70% cod liver oil ointment. Such a pack stimulates building up of granulation tissue and lessens the period of convalescence. The gauze pack should be removed daily and a fresh one applied. When the area is healed to the point where it is merely a small sinus tract,* the ointment can be packed directly into it with no gauze. This brings about a filling up of the tract which is then covered with epithelium.

Abrasions and Donor and Recipient Skin Grafting

THE abrasion is probably industry's most common traumatic lesion. Epidermis alone is usually affected. Most abrasions are simple friction burns. In most cases the area involved is usually a joint surface or near enough to one to be affected by motion. Abrasions are contaminated from the time of inception. Pain and capillary oozing are characteristic. A non-toxic, soothing, stimulating and bactericidal dressing is the method of choice in caring for these lesions. Because of the capillary ooze gentle pressure may be necessary to bring about hemostasis. A 70% cod liver oil ointment applied on fine-mesh gauze or old linen stops the pain and brings about the reparative processes. A proper gauze bandage will give the necessary pressure in case there is bleeding. The film of oil over the abrasion makes it unnecessary to immobilize the part. This factor is appreciated by the average worker who must continue his activities.

Donor skin graft sites following either pin-point or Thiersch's grafting are ideally treated with a cod liver oil ointment. These areas are practically sterile to start with and need only stimulation of epithelium to make them heal in rapidly. The protective film produced by the ointment seals off the nerve endings and when the local anesthetic has worn off the patient has no painful sensations. These dressings do not have to be changed daily. The primary dressing can usually be left on for about five days.

In pin-point grafting the recipient site is treated by many techniques, depending on the choice of the surgeon. It is generally recognized that by the end of 72 hours the donor areas of skin have either taken or died. Here again the area is presumably sterile and the great need is for a spread of epithelium. Clinically cod liver oil produces a rapid spread both from the pin-point graft and from the periphery of the wound. Daily dressings can be done painlessly. There is a serum response that nourishes the new epithelial cells and contamination is reduced to a minimum. It is well to bear in mind, in this lesion, that the agent used in the dressing must be absolutely non-toxic and must not inhibit epithelialization.

*Recently the 70% cod liver oil ointment (GADOMENT) used in our study has been put up in convenient gelatin applicators (GADOLETS) which are designed for use in body orifices.

Conclusion

IN CONCLUSION, the author has briefly reviewed his experiences, over a period of eight years, with a 70% cod liver oil ointment in the treatment of such surgical lesions as varicose ulcers, decubitus ulcers, abrasions, minor burns, indolent burns, donor and recipient sites following skin grafting, burns of the face, especially those around the mouth and the eyes, and such surgical conditions as secondarily infected pruritus ani, pruritus vaginae, and ano-rectal wounds.

From the investigative work that has already appeared in the literature, and the clinical observations made by the author over a period of eight years, it is apparent that cod liver oil as a wound dressing answers most of the needs presented by these specific conditions. It is extremely safe and simple to use. No blood determinations need be done and no toxicity has ever been reported.

Bibliography

1. LOHR, W.: Die Behandlung von frischen und alteren Hand- und Fussveretzungen mit Substanzver lusten mit dem Lebertran-Gipsverband. *Chirurg.*, 6:15, January 1, 1934.
2. HARDIN, P. C.: Cod Liver Oil Therapy of Wounds and Burns. *Southern Surg.*, May, 1941.
3. LOHR, W.: Die Behandlung grosser, flachenhafter Verbrennungen 1, 2, und 3 Grades mit Lebertran. *Chirurg.*, 6:263, April 1, 1934; abstracted *J.A.M.A.*, 102, 1991, 1934.
4. LOHR, W.: Der Lebertran bei der ausseren Behandlung von Wunden. *Deutsche med. Wchnschr.*, 60: 561, April 13, 1934.
5. LOHR, W.: Cod Liver Oil Salve Treatment of Fresh Wounds, Burns and Phlegmonous Wounds. *Zentrabl. fl. Chir.*, 61: 1686, July 21, 1934; abstracted *J.A.M.A.*, 103: 954, 1934.
6. LOHR, W.: Cod Liver Oil and Plaster of Paris Casts in Poorly Healing Ulcerated Stumps with large Tissue Defects Due to Charring, Freezing, or Amputation, *Zentrabl. f. Chir.*, 61: 1815, August 4, 1934; abstracted *J.A.M.A.*, 103: 955, 1934.
7. LOHR, W.: The treatment of Fresh Injuries, Burns and Phlegmonous Inflammations with Cod Liver Oil Salve with and without Plaster. *58 Tag. d. deutsch. Ges. f. Chir.*, 1934, Berlin. *Int. Abst. Surg.*, 59: 552, 1934.
8. LOHR, W.: Treatment of Obstinate Wounds with Cod Liver Oil. *Therap. d. Gegenw.*, 75: 444, October, 1934.
9. LOHR, W.: Die Behandlung der akuten und chronischen Osteomyelitischer Rohrenknocken mit Lebertrangips, *Arch. f. klin. Chir.*, 180: 206, 1934.
10. LOHR, W.: Treatment of Acute and Chronic Osteomyelitis of Tubular Bones by Means of Cod Liver Oil and Plaster Cast. *Deutsche. Med. Wchnschr.*, 62: 997, 1936; abstracted *J.A.M.A.*, 107: 833, 1936.
11. WAKELEY, C. P. G.: War Burns and Their Treatment. *Practitioner*, January to June, 1941.
12. Director General of Med. Serv. *New Zealand Med. J.*, February, 1941.
13. MEHERIN, J. M.: and SCHOMAKER, T. P.: The Cement Burn. *J.A.M.A.*, 112: 1322, April 8, 1939.
14. KAZANJIAN, V. H.: The Repair of Contractures Resulting from Burns. *New England J. Med.*, 215: 1104, December 10, 1936.
15. ALDRICH, R. H.: The Story of Burns, in MASON, R. L.: Preoperative and Postoperative Treatment, Philadelphia, W. B. Saunders Company, 1937.
16. MACCOLLUM, D. W.: The Early and Late Treatment of Burns in Children. *Am. J. Surg.*, 39: 275, February, 1938.
17. DRIVER, J. R., BINKLEY, G. W., and SULLIVAN, M.: Cod Liver Oil and Carotene Ointments in the Treatment of Indolent Ulcers. *Urol. & Cutan. Rev.*, 42: 587, August, 1938.
18. TUMANSKIY, V. K., and YATSEVICH, I. A.: Cod Liver Oil in the Treatment of Infected Wounds; Experimental and Clinical Studies. *Klin. Med.*, 13: 1528, October, 1935; abstracted *J.A.M.A.*, 106: 259, February 15, 1936.
19. IOST, V. I., and KOCHERGIN, I. G.: Clinical and Laboratory Evaluation of Cod Liver Oil Treatment of Wounds. *Novy. khir. arkhiv.*, 34: 476, 1935; abstracted *J.A.M.A.*, 106: 586, February 15, 1936.
20. LICHTENSTEIN, M.: Cod Liver Oil Dressings: Their Mode of Action. *Lancet*, 2: 1023, November 11, 1939.
21. VON DRIGALSKI, W.: Zur Wirkung des Lebertrans auf Bakteriengemische insbesondere Erdbakterien und Sporenbildner. *Deutsche med. Wchnschr.*, 62: 1005, June 19, 1936.
22. GETZ, H. R.: Cod Liver Oil Therapy in Experimental Tuberculosis. *Proc. Soc. Exper. Biol. & Med.*, 38: 543, May, 1938.
23. KUMMEL, H., and JENSEN, W.: Beitrage zum Wirkungsmechanismus des Lebertranwundverbandes. *Deutsch. Ztschr. f. Chir.*, 248: 238, 1936.

24. TRAXL, cited by LAUBER: Chirurgie and Vitamine. *Deutsche med. Wchnschr.*, 60: 569, April 3, 1934.
25. SCHAER, H.: Erfahrungen mit Unguentolan. *Schweiz. med. Wchnschr.*, 65: 724, August 10, 1935.
26. VELUPILLAY: A Preliminary Note on the Treatment of Leprotic Ulcers. *Journal of the Malaya Branch of the British Medical Association*, June, 1941.
27. BRANDALEONE, H.: Cod Liver Oil Therapy of Diabetic Ulcers of Feet. *Ann. Surg.*, 108: 141, July, 1938.

Simple Treatment for Fractured Metatarsals

URBAN E. GEBHARD, M.D.,
Milwaukee, Wisconsin

FRACTURES of the metatarsal bones occur frequently as the result of industrial accidents. The lengthy disability involved in what is obviously a simple fracture prompted me to seek a method of treatment which would permit a patient to return to his regular line of duty with a much shorter period of disability.

In this type of fracture, which is caused in industry usually by objects falling on the foot, there is seldom much displacement. There is often more than one metatarsal broken, but very rarely are they all broken. The treatment hitherto has been the encasement of the foot within a plaster boot for three to five weeks, and after this protective weight-bearing for another two or three weeks. Kellogg Speed states in his book on fractures that full weight-bearing is not possible until full bony union is shown on roentgenograms, and he further states that the rapidity with which this occurs varies with age and requires six to 20 weeks.

The method here described is applicable in fractures involving up to four metatarsals, since at least one is needed to hold the foot in position. A transverse bar is placed under the shoe in a slightly oblique position corresponding to the direction of the metatarsal heads at a point about 1½ inches to 1¾ inches in front of the heel. The exact location for the placement of this bar can easily be determined by having the patient apply weight-bearing with his foot in the shoe over a broom handle. The location for the bar then is at that point in front of the heel where there is practically no pain in the foot on weight-bearing. The bar must be high enough so that the ball of the foot will not touch the floor. The principle in the mechanics is that, on weight-bearing, the toes have a tendency to reach for the floor, forming a natural metatarsal arch, whereas weight-bearing within a cast is uniform throughout the foot and causes a flattening of the metatarsal arch.

In my first series of cases, I had cobblers make the bar of leather. However, because of the difficulty in getting the proper type of bar made, I decided that the ideal bar could be made from sections of an oak or maple hoe or rake handle, which is about the correct thickness. This piece of round, hard wood should be just the width of the sole of the shoe at the point in front of the heel where it is to be placed. One side of the wooden block is flattened by simple carving and placed under the shoe at the point where the patient has relief from pain on weight-bearing. This is usually in the region of the tarsal-metatarsal junction. Two drill holes are made through the shoe from within, into the wooden block, and the block is screwed to the shoe from the inside with flat-headed screws. This is the simplest method and, to date, the most satisfactory. After the bar is in place, it can be carved with a knife to provide uniform weight-bearing. If desired, flat-headed tacks may be inserted into the bar to prevent wearing. Weight-bearing is begun as soon as the patient is able to get a regular shoe on the injured foot, which is approximately after one week. He is then immediately returned to work. This bar is worn for five to seven weeks. It is essential that the patient wear these shoes at all times, even about the house. After two weeks, a patient may attempt to walk about the house wearing slippers, only to find that the pain is so severe that it is impossible to walk without the aid of the protecting bar. The bar must be high enough to eliminate all contact of the ball of the foot with the floor when walking.

A modification of this transverse bar likewise should be the answer to the so-called "march foot."

In my series of cases to date, all have been returned to work within 10 days following the fracture and have worked continuously thereafter. These men are of varied ages. Some of them fixed the bars themselves according to my directions. All were enthusiastic about the simplicity of the treatment and marveled at the absence of pain. Follow-up x-rays before these patients were discharged as cured showed good results in every case. None showed any displacement, and there is no over-amount of callus deposited.

Dental Services in Industry

—Observations on Their Effects in the Reduction of Absenteeism—

HAROLD A. HOOPER, D.D.S.,
Dental Consultant,
Chicago, Milwaukee, St. Paul & Pacific Railroad, Chicago

IN TERMS of the nation's job, the aggregate of employee absenteeism from work on account of illness is startling in amount, ominous in implications. The accepted figures, related to 1941, show more than 400,000,000 industrial man days lost from sickness alone, exclusive of injuries. Since the ratio of non-occupational illnesses to occupational diseases is about 300 to one, this loss is practically the result of sicknesses for which industry is not responsible. Nevertheless these non-occupational illnesses are a constant drain on industry; a burden on the employee in reduced earnings, an imposition on the employer in added expense. But more important than either of these now is their cost in *time* itself. As late as even a few years ago the money inroad of such illnesses was of primary concern to the employer; for example, industrial relations directors were generally agreed that it was necessary to pay 21 men in order to keep 20 men regularly at work. The economic reckoning had an expense basis related to cost of production; it was studied in terms of payroll. Now, however, the economics of employee absenteeism must be studied in terms of the national war effort and the expense of precious time; in terms of the necessity for haste—the kind of haste that means not only hurrying where hurrying is possible, but also not delaying where delaying is preventable.

The analysis of the phenomenon of employee absenteeism began some years since. The initial step was to measure the problem. Its size, as above said, is now established. The next step was to analyze the causes, and—under the impetus of the acceleration of industry, spurred by war—to analyze them quickly and effectively. In view of the necessity of full-time production by every worker, especially if *to any degree whatsoever* he is a skilled worker, it is *now imperative* (1) that the causes be ascertained, and (2) that the means of prevention be immediately undertaken.

The problem, of course, is widespread and varies as between different kinds of industries. It is also influenced by the climatic effects of geographic location, the

season of the year, the general living conditions, and to some extent the community background. These, however, are objective conditions, more or less incidental to the major causes. The latter are completely subjective, inherent in the individual. Not all major causes are general, i.e., not all of them apply to large groups. But one or more of them applies to every group, large or small. Some are related to individual types and personal idiosyncrasies.

There are two of these major causes which, if they could be satisfactorily controlled, would reduce the aggregate loss of time from employee absenteeism on account of non-occupational illness by 75 to 80%. One of the two is beyond immediate control. That one is the common cold.

The Common Cold

SOME idea of the place of the common cold in this economic sabotage of working time may be gathered from the published reports of the Institute of Public Opinion (Gallup Poll). The conclusion from the figures obtained in recent repeated studies to date is that the common cold is responsible for 50% of employee absenteeism from the job.[1]

No medical man needs to be told of the difficulties presented by this inhibiter of production. Every industrial physician observes daily the effects of its incidence upon the worker who is trying to stay at work—not sick enough to go home, and far from being sick enough to feel that he ought to see his doctor. Probably about half the time this condition results in a day or two of absence from work. The contributing factors here are the cold itself and what might be called "the health consciousness" of the individual. Industrial physicians are doing everything that can be thought of in this relation. Their prime consideration, of course, is the well-being of the employee. Increasingly it is being required that colds be noted, particularly by the nurse, who maintains the closest medical contact with the working force. The doctors advise and suggest, and at the proper point recommend that the afflicted person see his family doctor. This, however, the employee, usually feeling that he "isn't sick enough to see the doctor," does not do. All of this is by way of saying that the problem of time lost from the common cold is very difficult to handle from the preventive side.

In efforts toward prevention a great many things are being accomplished. Some concerns are installing ultra-violet lights as a part of their air conditioning systems to minimize the bacteria count in the atmosphere, and others are studying, and some are applying, nutritional and other aids toward keeping individual resistance at a high point. Meanwhile physicians and research workers throughout the country are bending their efforts toward scientific and widely available prophylaxis. This has been meeting with some success, evidenced by the production and increasing use of oral vaccines for cold prevention. Lately the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS established a standing committee for the common cold, under the chairmanship of DR. A. G. KAMMER, Medical Director of the Inland Steel Company.

It is obvious from the foregoing that this first cause of employee absenteeism, responsible for 50% of it, poses a problem that will not be easily or quickly solved. Since this discussion is not centered about this cause, but another one, we can leave it to those who are working on it, and proceed to the cause which is second in importance. This second cause will be more satisfactory to deal with because the means of prevention are well known. The reason it is a major cause is not lack of knowledge but only lack of application.

Oral Conditions

THERE is authority for the statement that at least 25% of employee absenteeism from non-occupational illnesses is *directly traceable to oral conditions.*

Anyone who wants to investigate can easily find the basis for this statement. The logical beginning point of study would be the prevalence of dental impairments in the employed. Their majority prevalence in the general population has been common knowledge, especially since World War I. They caused more rejections at that time than any other physical defect; and in this war, with the higher military standards, the huge proportion of dental disqualifications is a matter of grave governmental concern. That this condition is reflected in the industrial population is well proved by innumerable examples. A few will suffice; more would labor the point.

1. In 2,469 employment medical examinations in 1928, SAPPINGTON[2] discovered 15,491 defects of all kinds—an average of 6.3 per person.

2. "Another large industrial concern found that more than 95% of its employees had defective teeth and diseased gums."[3]

3. "In three store dental clinics in Boston in the last two years, with a total of 2,605 cases diagnosed and recorded, clean mouths were found in 19.9%; fair

COMPANY	YEAR	EMPLOYEES
Lord & Taylor, New York	1914	2,300
American Cast Iron Pipe Co., Birmingham, Ala.	1915	1,000
Hood Rubber Co., East Watertown, Mass.	1915	5,000
Firestone Tire & Rubber Co., Akron, Ohio	1915	10,000
New York Stock Exchange, New York	1917	2,350
Kohler Company, Kohler, Wis.	1917	3,200
Wyomissing Industries (Textile), Philadelphia	1917	10,000
National Cash Register Co., Akron, Ohio	1918	6,900
Armour and Company, Chicago	1918	8,800
New York Telephone Co., New York	1918	45,000
Chicago Tribune Employees' Benefit Plan, Chicago	1919	2,850
Yale & Towne Manufacturing Co., Stamford, Conn.	1919	3,354
John B. Stetson Co., Philadelphia	1919	3,372
Selby Shoe Co., Portsmouth, Ohio	1920	2,300
Stix, Baer & Fuller, St. Louis, Mo.	1920	2,500
Endicott-Johnson Shoe Mfg. Co., Johnson City, N. Y.	1920	20,000
Frederick & Nelson (Department Store), Seattle, Wash.	1921	1,500
New York Daily News, New York	1921	1,700
International Harvester Co., Chicago	1921	65,000
Real Silk Hosiery Mills, Indianapolis, Ind.	1922	3,035
L. Bamberger & Co., Newark, N. J.	1922	5,000
Travelers Insurance Co., Hartford, Conn.	1922	5,500
Maryland Casualty Company, Baltimore	1925	950
Eastman Kodak Company, Rochester, N. Y.	1925	1,500
Halle Brothers Co., Cleveland, Ohio	1925	1,500
Paraffine Companies, Inc., Emeryville, Calif.	1926	900
Dunn & McCarthy (Show Mfrs.), Binghamton, N. Y.	1926	1,300
Avondale Mills (Textile), Sylacauga, Ala.	1926	3,000
Corning Glass Works, Corning, N. Y.	1926	3,300
Crane Company, Chicago	1926	8,500
Central of Georgia Railway, Savannah, Ga.	1927	5,864
Swift and Company, Chicago	1927	8,000
International Tel. & Tel. Co., New York	1928	4,500
Goodyear Tire & Rubber Co. of California, Los Angeles	1929	1,773
American Smelting & Refining Co., Baltimore, Md.	1930	1,335
The May Company, Los Angeles, Calif.	1930	3,000
Philadelphia Co. & Subsidiaries, Pittsburgh, Pa.	1930	9,800
Chicopee Mfg. Co., Chicopee, Ga., Gainesville, Ga.	1931	800
Pepperell Mfg. Co. (Textiles), Lindale, Ga.	1931	1,800
New York Life Insurance Co., New York	1931	4,391
Scott Paper Company, Chester, Pa.	1932	950
Western Cartridge Company, Alton, Ill.	1933	2,500
Columbia Steel Company, Provo, Utah	1934	360
Kieckhefer Container Company, Delair, N. J.	1935	1,025
Rock Island Employes' Hospital Assoc., Chicago	1935	11,000
Tulsa City Line Co. (Bus), Tulsa, Okla.	1936	200
Servel, Inc., Evansville, Ind.	1936	5,200
Union Oil Co. of California, Los Angeles	1936	7,000
McWayne Cast Iron Pipe Co., Birmingham, Ala.	1937	450

The foregoing is from the study of dental service in industry recently made by the American Dental Association. Questionnaires to 841 A.C.S. approved industrial medical departments brought 498 replies, 116 reporting a dental service of some kind. About half of these, however, did not provide much more extensive service than a periodic examination and referral of employees with dental defects to private dentists. The other half (57), of which 49 are listed above, provided more complete service—varying from emergency first aid, cleaning, extractions and periodic prophylaxis for employees only, to complete medical service for employees and their immediate families (Endicott-Johnson).

mouths in 53%; and neglected mouths in as many as 27.1%"[4]

4. "Black, in his investigation of the prevalence of dental infections, found that 78 of every 100 persons averaging 35 years of age had infected teeth."[5]

5. "In a recent study, KAMMER[6] examined 10,000 men in a steel plant, of which 6,100 were old employees and 3,900 were applicants for work. . . . *The most common type of defect among the old employees was dental impairment (42%).* . . . MISHLER[7] in discussing the effect of the annual physical examination in raising standards of employee health and efficiency, found in 1935 among 3,072 men examined that 1,864 had no physical defects and 1,208, or 39%, were with physical defects. Of this number 436, or 36%, had these defects corrected by their family physician. In 1938, 508 of these men were re-examined and only 52, or 10%, were found to have any defects whatever *and 65% of these defects were carious teeth. . . .*"[8, 9]

Further evidence of the prevalence of dental defects in workers, in addition to the numerous statistical data already available,[9] is being developed by industrial physicians, (notably DR. M. H. KRONENBERG, Chief, Division of Industrial Hygiene, State of Illinois Department of Public Health).

The industries of the country have made substantial progress in the discovery and correction of dental impairments. Practically every company that requires physical examinations, either pre-employment or periodic, includes some attention to oral conditions. Industrial physicians make it their rule to suggest and in many instances urge that the examinee have his dental defects corrected. Sometimes, but not often, this is made a condition of employment where an applicant is being examined. Where an employee is involved, it is practically always a matter of follow-up to see that the suggestions are carried out. A substantial, and growing, number of companies have established dental services as a feature of their medical departments. A fairly complete summary of these is given in the table on the opposite page.

But in the main, too little is being done. The average medical examination does not include x-rays of the teeth, which is the only way a real diagnosis or prognosis can be made.

And the average follow-up is more desultory than insistent. This is so true that it can be safely said that the usual dental defects discovered in the mouths of applicants for employment and employed persons almost invariably get worse before they get better.

And that is the point where this entire thesis has its application to the problem of employee absenteeism from work.

The relation of oral sepsis to disease conditions throughout the body is too well known to medical men to be more than mentioned here. It is so well known that, in a manner of speaking it is one of those things where familiarity breeds contempt. It is like the common cold in the fact that it is looked upon as something which can not be helped, rather than something which can.

Indeed, there is some evidence that it is as bad as the common cold.

Consider the following:

Ten years ago the U. S. Public Health Service published an analysis of certain phases of a broad series of health examinations (17,294 persons in 28 occupations) made by physicians cooperating with the Life Extension Institute.[10] The following figures, taken from that analysis, show the percentages of "carious teeth—septic roots" and "frequent colds." There is a significant similarity:

OCCUPATION	CARIOUS TEETH SEPTIC ROOTS	FREQUENT COLDS
Bricklayers	23.2	21.1
Blacksmiths	21.5	18.0
Iron Workers	20.5	21.4
Plumbers, Pipe and Steam Fitters	20.4	17.1
Factory Workers	20.0	19.4
Wood Workers	17.9	18.9
Shoe Factory Operatives	17.3	17.7
Textile Mill Operatives	16.9	18.8
Machinists	16.1	17.4
Electricians	15.0	18.5
Metal Workers	15.0	19.3
Miners	17.7	17.4
Cutters (Cloth)	14.7	18.3
Chauffeurs	18.3	20.5
Business	12.1	14.9
Butchers	17.4	17.5

Tabulations were made and comparisons drawn as to the proportions of impairments found in the occupational groups as against the business groups. For instance, "all but one of the 28 occupations under consideration had higher rates for carious teeth than the average rate for the business group." The conclusion of this study contained the following: "It was found that the higher rates characteristic of the industrial workers were not to be explained, except in a few instances, as being due to the hazard of any specific occupation. On the contrary, these higher rates seemed to be the result of various factors associated with social, educational, or economic causes, and to be present, in more or less degree, in every specific occupation studied."

Relation to Other Ailments

THE direct bearing of oral conditions on other bodily ailments has a literature of its own, replete with clinical evidence.[9] Selecting at random, one may begin with the often-published illustration from the statistics of Metropolitan Life Insurance Company. The physical records of 1,000 employees with good mouth conditions and 1,000 employees with poor mouth conditions were picked at random from their files.[11] The case data are compared in the accompanying table:

	GOOD MOUTH CONDITIONS	BAD MOUTH CONDITIONS
Neuralgia and Neuritis	3.8	8.3
Headache	1.9	3.2
Nervousness	1.7	4.5
Colds	19.8	23.8
Furuncles	2.4	4.5
Abscesses	2.6	4.5
Albuminuria	0.9	3.3

In 1918, years before these figures were evolved, an industrial chief surgeon published the following:[12]

"Several years ago Sir William Hunter called attention to the extraordinary frequency with which oral sepsis is overlooked by all concerned—the patient, physician, surgeon, and even the dentist. It is not my desire at this time to point out how common a cause of disease mouth infection is, how grave its effects, or how often it is lightly regarded. . . . The special interest of dental disease arises from this: (1) that dental cario-necrosis is the commonest and most prevalent infection in the body, and (2) that this infection is of a 'mixed' character, including not only harmless organisms, but also all the most active pathogenic organisms known to the bacteriologist. The importance of oral sepsis, or mouth infection, from an industrial standpoint has been repeatedly emphasized by numerous cases brought to our attention. These have resulted in considerable loss of time, lessened productivity, caused more or less crippling of individuals and general lowered resistance to infections, and have even been the

unsuspected source of persistent ill health, due to secondary infections in the heart, stomach, kidneys and joints."

As lately as January, 1942, this was emphatically reaffirmed:[13] "Sterling V. Mead, in his recent book, 'Diseases of the Mouth,' states that oral sepsis may aggravate disease of the lungs and respiratory tract; in many instances, a mistaken diagnosis of tuberculosis may be made because of symptoms resulting from oral sepsis, and head colds may be caused or aggravated by dental infection and, in many cases, recur frequently until dental infection is eliminated. Better dental health care, including treatment and elimination of dental infection, would undoubtedly reduce the incidence of colds among industrial workers, and greatly reduce more serious complications. Rheumatic conditions are common among industrial workers, resulting in much suffering and disability. Rheumatism covers a wide variety of ailments, the most common of which are arthritis, myositis, lumbago, neuritis and bursitis, which present a difficult problem for industrial medicine. . . . Dental infection has long been recognized as a predisposing cause of many of these ailments, and the eradication of oral sepsis has been advised or insisted upon by most medical men. There are other predisposing causes of rheumatism, many and varied, such as improper diet and climatic, chemical, mechanical and endocrine conditions, but focal infection is the dominant cause. Moorehead, in a study of 498 cases of chronic arthritis, found x-ray evidence of root-end infection in 89% and evidence of pyorrhea in 78%. The industrial physician or dentist frequently witnesses spectacular recoveries from acute attacks after one or two infected teeth have been removed. Medical histories of workers suffering from various rheumatic ailments over considerable periods are common, recurrent attacks continuing until dental infection has been eliminated. In chronic forms, particularly arthritis, in which structural changes of joints have occurred, the elimination of dental infection will not bring about recovery, although pain and the inflammatory reaction may be relieved. Industrial injuries involving bones, joints or muscles are often aggravated by dental infection, which delays recovery, prolonging incapacity and complicating treatment. Injuries are sometimes claimed, as in strains or wrenches, which in all probability are acute inflammatory disturbances, such as myositis and lumbago, with focal infection as a predisposing cause. The medical care of virtually all rheumatic ailments includes routine dental examination, with complete x-ray examination, and subsequent treatment and eradication of dental infection. Better oral hygiene among industrial workers and adequate dental health care would in all probability sharply reduce the incidence of rheumatic ailments, a major cause of loss of time, suffering and incapacity. . . . Dental infections may cause even more serious gastro-intestinal disease, such as ulcers of the stomach and intestines, colitis, infection of the gall-bladder and appendicitis. . . ."

"And Duke, a medical authority, in the study and tabulation of 1,000 medical cases, found 66% showing dental infection in the x-ray room."[5]

In Terms of Lost Time

Now, let us translate the foregoing into the terms of days lost.

In their excellent survey of non-occupational illnesses and injuries in a major oil refinery, FORSTER and LEEDKE tabulate the following with reference to the incidence of diseases other than those of the respiratory tract, these having developed 74 cases, causing 1951 days of lost time:

TYPE	NO. CASES	DAYS LOST
Arthritis, neuralgias, neuritis, rheumatisms	17	462
Carbuncle	1	16
Cardiac condition	1	44
Cellulitis	2	33
Communicable diseases:		
Chickenpox	1	12
Erysipelas	1	36
Mumps	1	25
Circumcision	2	10
Dental conditions	2	20
Dermatitis	3	34
Epistaxis	1	5
Gastro-intestinal	18	774
Generalized septicemia	1	89
Hemorrhoids and rectal abscesses	8	104
Herpes simplex	1	19
Mastoid and ear infection	2	72
Tonsillectomy	7	114
Genito-urinary	5	82

These figures are illuminative. First, the dental conditions themselves. The two cases listed were acute, necessarily so, to cause 20 lost days. But what about the dental conditions that were not acute? Industrial physicians are all too familiar with the diseased mouth and the reluctance or negligence of its possessor to get it cleaned up. Too often it is full of dead teeth which may or may not have been x-rayed at some previous time, although usually not, and which—whether or not—are allowed to fester until the gums beneath them fairly percolate pus. It is only by the grace of the dentists throughout the country who work at nights that such conditions don't cause more absenteeism when they become acute, as, sooner or later, they inevitably do.

Meanwhile, back to the table. It will be seen that aside from the "dental conditions" themselves, *the three types of diseases which are directly traceable to oral conditions* (arthritis, etc., gastro-intestinal and genito-urinary) *caused 67% of the total days lost.* This is not to say that all of the days lost from these particular diseases here were actually due to oral sepsis. The point is that from the nature and the effects of oral sepsis, they might have been; and the fact that they were not necessarily so in the situation of the foregoing table does not say that they might not be so in many other situations. It is interesting to note, however, that even here some of them undoubtedly were; one of the five cases classed as genito-urinary "*began in a dental condition* but was so counted because it was the kidney lesion which prolonged his disability and from which he is still suffering."

From all of this—and the much more that could be adduced if space permitted—"it follows, therefore, that the close cooperation of physician and dentist in the handling of these cases is much to be desired, if satisfactory results are to be obtained. This is especially true in those cases in which dental foci of infection produce chronic degenerative diseases, which lower the productivity of the employee, besides shortening his span of life. *The results obtained in this connection are really astonishing, and the vast improvement in the general health of the workmen following the elimination of their mouth infections* justifies the establishment of dental clinics in connection with medical clinics in industry."[15]

This kind of evidence can be multiplied *ad infinitum.* Enough, however, is presented to sustain a couple of conclusions which should be so emphatically and repeatedly confirmed by *all* physicians (the *all* includes private practitioners) that they will become principles. These conclusions are:

1. The "industrial health" of which so much is being heard, is not only a matter of the prevention of occupational hazards, but also, and more, it is the matter of the prevention of individual ailments. If prevention

is to prevent, both of these, and all of each, must be headed off at source. And

2. The source of most ailments, i. e., the one single source to which more ailments are traceable than any other, is the mouth.

It should be blazed upon the "health consciousness" of every individual, doctor and layman, that *the roots of disease*, generally speaking, *are the roots of the teeth*. And it should be remembered by every physician that "industrial health" will eventuate as little more than a shibboleth unless *all* physicians realize that they will be doing their maximum best for industry and the nation only when they have *prevented* to the point where it is necessary for them to do only their minimum least for the individual worker.

Invitation to Prophylaxis

WHERE to begin? The place to begin is with what might be called the "professional consciousness" of both doctors and dentists. This will involve a change of attitude, a difference of outlook. Doctors and dentists alike must treat the individual "not" (in SAPPINGTON'S words) "as a category of disease possibilities" but instead as an invitation to prophylaxis.

Prophylaxis is the one form of prevention which can never be too early, and never too late. The mouth that is septically clean, hygienically clean, is the most definite "vanishing point" of ill health known to medical science. In the mathematics of medicine it is the "zero" of more infections than any other single cause or source of infections. For the disbeliever, a study of the literature of the human bite is recommended. Its theme is well summarized in the following: "Human bites cause wounds which rapidly become foul smelling and necrotic, invade the deep tissues and resist all therapeutic measures. Organisms implanted by the human teeth are of the more virulent kind, often anaerobic, such as the fusiform bacillus and the spirochete of Vincent. Streptococci, staphylococci, colon bacilli, fungi and occasionally the spirocheta pallida may, any or all of them, contribute to the formation of formidable lesions."[16]

What To Do

THUS far it is plain that dental impairments are a major, if not, indeed, the major fundamental cause, of the kind of employee ill health that results in absenteeism from work. From this it follows that all who are interested in the quality and continuity of the work that is going on in industrial establishments of the nation must get busy. The four who are most interested are (1) the industrial executive, (2) the industrial physician, (3) the private practitioner, and (4) the employee himself.

1. *The industrial executive*—not the personnel man nor the plant manager, but the president or the operating vice-president—must consider what oral antisepsis insisted upon and maintained among his employees would mean in the terms of more production. If he will give this the same kind of business-like analysis that he gives his other production problems, there will be a great and sudden increase in the number of dental clinics set up in industry, and, in the short time pending that, an *instant* demand for dental x-ray equipment. The Army, the Navy, the industrial medical men, and the insurance companies are aware that x-ray pictures furnish the only sure way to *find* sepsis. Once it is found, the resultant ravages of continual absorption—even in the lesser range of nutritional and gastric upsets and interferences, to say nothing of the numerous more serious disturbances—can be headed off. And heading them off *now* is the duty of every employer—incumbent in the general cause for the nation, and in his own individual behalf lest compensation overtake him.

2. *The industrial physician*, if he is going to allow the expression of his specialty its ultimate realization, must extend his examination of the mouth until it is as thorough and complete as is his examination of the rest of the body. If this means dental x-rays of every examinee, then these must be taken. If it means insistent and persistent follow-up, then this must be done. If it means more nurses, so that this follow-up may be effective, then more nurses must be employed. There isn't time for half measures; time is so precious that the utmost of personnel and equipment will have all they can do. THE AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS might well have a committee on oral sepsis. The material it could accumulate would be invaluable. Oral antisepsis, and its antithesis, dental pathology, are just as important in the modern industrial health program as lung or any other conditions.

3. *The private practitioner* can't wait to be called into the picture of industrial medicine; he must get into it on his own initiative. One way to do this was suggested in an inspired editorial recently appearing in a state medical journal:[15] "Each private practitioner not otherwise fully occupied can elect himself a part time industrial physician for his community for the duration. Each will know what to do, after a study of his own clientele. Consider one week's avoidable sick leave from even a small job that is important to our defense effort; consider one week's avoidable illness of the farm hand; yes, consider one week's avoidable illness of any citizen. Add these up for the whole country and it makes literally years of precious working time lost and possibly delays final victory."

There is hardly a family doctor in the country whose "study of his own clientele" in so far as persons employed in industry are concerned, wouldn't result in an immediate and terrific increase in the number of visits paid to the local dentists. This suggestion should be printed and framed on the wall of every doctor's office in the country, and below it should be the words: "*Begin with oral sepsis.*"

4. *The worker himself?* "Aye, there's the rub!" The inertia of his lack of interest must be overcome. There's a parallel in the safety movement; and the safety bulletin boards in the plant are good places for the red letter injunction: "Keep your mouth clean!" It is not too much to vision the ultimate logic of a tooth-brush and dentifrice dispensary adjacent to the salt tablets, and the soft drinks and candy. Education is the *sine qua non*, and the need is urgent. The radio commercial that urges mouth hygiene is doing something, but it is too bad that its repetitions so soon benumb.

The Compensation Future

IF THE industrial executive should fear that the dental equipment installed now to do the clean-up job that must be done for the war conditions, will be top-heavy after the war, he can quiet his apprehension by some thought along two lines:

1. The advantages and benefits of a dental clinic in industry are so comprehensive and persistent that they will survive under any conditions. The universal verdict of those who have them is that they wouldn't do without them, at least in their 100% value in physical examinations.

2. A hidden advantage, which will become more apparent as time goes on, is the effect of dental conditions on compensation. Dental impairments are not compensable *per se*. It should not be necessary, however, to remind how often and how seriously they develop into

and cause other conditions which have compensable aspects. It is probable that if they were compensable in themselves they would have received a lot more attention prior to this time. But now comes the warning that they will be.

At the 78th mid-winter meeting of the Chicago Dental Society recently held, DRS. ISAAC SCHOUR and B. G. SARNAT, University of Illinois College of Dentistry, reported that[16] "unrealized by the worker the characteristic mark of his particular work in industry is often indelibly stamped on his teeth. The seamstress has characteristic small nicks in the cutting edges of the middle incisors caused by biting off threads. The carpenter shows much larger niches worn there by the nails he often holds in his mouth. The pipe smoker wears off the tops of several teeth with his pipestem. The glassblower develops a larger symptom in which the inner corners of the central incisors are worn away by the mouthpiece of his tube. These are signs of mechanical wear in specific occupations. Other 'occupational stigmata' are due to local chemical effects. The teeth of an enamel worker are often stained. The baker will develop inflammation of the tissues surrounding the teeth from flour dust and will show caries or decay from sugar dust. Metal workers—iron, copper, chromium, etc.—also show stained enamel, and often the lining of the mouth will be similarly stained. Stone workers develop inflammation of the gums from abrasive dusts of their trade, and food or wine tasters sometimes develop difficulties with their sense of taste, either complete failure of the sense or variations from normal taste reactions. Similarly serious are systemic effects due to the absorption or inhalation of fumes. Acids will sometimes erode the enamel of the workman's teeth. Carbon monoxide fumes turn the inside of the mouth a brilliant red. Benzine causes hemorrhage; so do the changes in atmospheric pressure among aviators and caisson workers. Heavy metals, such as lead or bismuth cause pigmentation and mercury causes stomatitis."

When these things begin to add their weight to the cargo of the Juggernaut of compensation, it will be of little help to read the rest of this report:

"Actually the occurrence of almost any occupational marks in the mouth of a workman is largely his own fault, for an essential factor is poor oral hygiene. The job provides the basic cause, whether it be dust, abrasives, chemicals; but these will not produce symptoms unless the worker himself fails to take proper care of himself. But, if he does so fail, the severity of the resulting condition will be determined by the extent of his failure. . . . It is futile to try to treat the conditions, unless industry removes the cause—by the use of masks or ventilation systems—and unless the worker learns to take care of his mouth adequately, under the tutelage of his dentist and physician."

That's the point: "Unless the worker learns to take care of his mouth." If his mouth isn't clean it won't be industry's fault, because industry is removing the cause just as fast as the cause can be found to yield to masks, ventilation systems, and every other means and device.

But it *will* be industry's *cost*, in more of those insidious encroachments of compensation which have so characterized "occupational" diseases. That cost in the main can be headed off—in the ways and the manner hereinbefore stressed.

Summary

TO SUMMARIZE: No student of the problem of employee absenteeism resulting from non-occupational illnesses can come to any other conclusion than that oral sepsis is a major, if not *the* major, underlying "root" cause of an astonishing proportion of it. Nor can he fail to find that oral sepsis, unlike the common cold, can be handled now, and with the means at present available. Nor, whether he is executive, physician, dentist or worker, can he fail to appreciate the patriotic duty—rather, the patriotic privilege—of going about it at once to see that the solution of this problem of absenteeism, to the full extent of the elimination of oral sepsis, is undertaken forcefully and forthwith.

If this is written in the tempo of urgency, it responds to the tempo of the times. Nothing is too large to be faced; nothing is too small to be undertaken. Here is a partial solution of the problem of absenteeism —a solution so universally potent in possibilities that it may turn the scale of a battle, and so small in individual particulars that every person—executive, physician, dentist and worker—can do his effective part. Let it not be said of the medical profession at least that the value to the nation of its interest in the now imperative oral prophylaxis was either "too little" or "too late."

References

1. Colds and the Gallup Poll. *Med. Rec.*, February 4, 1942.
2. SAPPINGTON, C. O.: Incidence of Dental Defects in 2,469 Employment Examinations. *J. Am. Dental Assoc.*, November, 1928.
3. BOSSERT, WALTER A., D.D.S.: Importance and Value of the Industrial Dental Clinic. *Dental Economics*, August, 1931.
4. EMMONS II, ARTHUR B., M.D.: Store Dental Service. Massachusetts Dental Society, May 7, 1925, distributed by Am. Dental Assoc.
5. *J. Am. Dental Assoc.*, January, 1942.
6. KAMMER, A. G.: The Health of Steel Plant Workers. Cited by SAYERS and BLOOMFIELD; Health Problems of Workers. *Indust. Med.*, March, 1940.
7. MISHLER, W. E.: The Annual Physical Examination: Its Effect in Raising Standards of Employee Health and Efficiency. *Indust. Med.*, August, 1939.
8. SAYERS, R. R., and BLOOMFIELD, J. J.: Health Problems of Workers. *Indust. Med.*, March, 1940.
9. Library of the American Dental Association, 212 East Superior Street, Chicago.
10. BRITAIN, ROLLO H., and GODDARD, JENNIE C.: Rates of Physical Impairment in 28 Occupations, based on 17,294 Medical Examinations. *Public Health Reports*, 47:1, January 1, 1932.
11. KEGEL, ARNOLD H.: What is the Economic Value of Dental Health to the Community? *J. Am. Dental Assoc.*, June, 1931.
12. ELLIOTT, R. W.: Industrial Dental Clinics from the Standpoint of the Industrial Surgeon. *The Dental Summary*, June, 1919.
13. Dental Preparedness Committee: A Call to the Dental Profession. *J. Am. Dental Assoc.*, January, 1942.
14. FORSTER, N. K., and LEEDKE, HAZEL A.: A Survey of Non-occupational Illnesses and Injuries in a Major Oil Refinery. *Indust. Med.*, January, 1941.
15. Editorial, *Rocky Mountain M. J.*, January, 1942.
16. LEARY, JAMES C.: Your Teeth Tell What You Do to Earn Livelihood. *Chicago Daily News*, February 26, 1942.
17. MILLER, HARRY, and WINFIELD, JAMES M.: Human Bites of the Hand. *Surg., Gynec. & Obst.*, 74:153-160, February, 1942; abst. in *Modern Med.*, March, 1942.

Industry Goes Collegian

G. MALCOLM BAIRD,
Evansville, Indiana

INDUSTRY, in and about Evansville, Indiana, during the past few years has operated on about as even a keel as any other city of like size in the United States. This has been due to the nature of its productions, which have never been greatly affected by seasonal market conditions or style changes. The chief products include a world renowned baby-food, popular brands of flour, lumber, coal, refrigerators both mechanical and gas, air conditioning units, farm implements, automobiles, and an occasional producing oil well.

Imagine, then, the complete metamorphosis when the guns of destruction blazed forth at Pearl Harbor, December 7, 1941! Future plans for normal output were immediately discarded for war effort requirements. New and baneful chemicals and materials, new problems with their incumbent accident and health hazards, increased production and longer hours,

and assignments of jobs involving exposure to workers whose vitality had been lowered by fatigue and by increased work hours, with consequent loss of efficiency and increased absenteeism, together with ever-increasing reminders from Federal and state public health agencies to increase the vigilance on safety and health —all these made new procedures necessary as a vital part of the war program.

Just how to inaugurate a program which would meet the imperative safety and health requirements was a problem. There was seemingly no precedent to follow. Although ways and means of prevention were more or less common knowledge, their application had not been enforced with real efficiency except in a few instances. There was much groping about, much resorting to the old trial-and-error methods. But not for long. A few of the more visionary persons quickly devised a real program of accident and disease prevention. They started by calling into conference certain established agencies; and order was soon brought out of chaos.

In an emergency, time is a vital factor. And time does not permit each industry through its own efforts to fathom directly all the ill effects that may arise from the use of the many strange materials the emergency makes necessary. Not only were new and improved methods of processing to be devised, but protective equipment for workmen likewise was in order. All this required the utmost attention to a multitude of detail. It was indeed a revelation for many to learn that the very scientific information they needed was not only available, but was also right at their fingertips, usually in the possession of their own industrial physician.

THUS there has been developed, here in Evansville, the closest cooperation between the industrialists who are vitally concerned in the emergency needs; and an orderly and organized effort for the preservation of life, limb and health has been instituted, with literally everyone participating in the conservation of the individual well being.

Educational institutions which had specialized in industrial problems, and other agencies concerned in like work, were brought into the picture. And quickly an educational program was evolved, sponsored by Purdue University and operated locally by Evansville College.* On Monday and Thursday evenings, classes are conducted under the supervision of COLONEL THOMAS DOBBINS, Servel's able Medical and Safety Director, who has had many years of experience in both military and industrial preventive medicine in America and Europe.

COLONEL DOBBINS has presented a well planned and intensely interesting course of instruction, as evidenced by the ever increasing number of key men enrolled from those of our industrial plants which have war contracts.

The first part of the course covered thoroughly the general background of industrial safety, accident prevention, occupational disease, and preventive medicine. This was followed by instruction dealing primarily with the very important subjects pertaining to the setting up of safety organizations, emergency hospitals, and accident statistics and records.

The third part of the course will be devoted to the study of proved safety equipment and its uses, compensation laws and claim adjustment, and safety psychology and its application. Of course, throughout the period of instruction, experts on various phases relating to some of the more technical subjects have been in attendance. Several of the larger plants have been visited by the class, and actual problems have been studied.

In these lay conference-conducted classes where those present may openly discuss their daily problems, and often reach final solutions, it is interesting to note facts and figures. For instance, there was one plant employing about 2,000 people that had suffered 12 hernia operations during the course of a year, while another plant engaged in a similar line of endeavor and employing twice the number of people had not suffered an industrial hernia for over six years.

Dermatosis, according to COLONEL DOBBINS, is coming down from its economic pedestal as industry's Public Enemy No. 1. Its prevention is a matter of educating the employee in his personal hygiene.

Hydrofluoric acid, mercury, and magnesium have gained recent prominence in new process methods. The hazards incident to their use are medical history, but protective methods were studied, recommended, and adopted *prior to exposure*, and became general information about the plants.

Education of the worker as to the nature of exposure risk, and his own part in minimizing it by intelligent use of properly prescribed protective equipment, are a big part of our safety and health program.

National Safety Council's Staff Health Program

IN FOCUSING attention on the safety and health of others, the National Safety Council has not lost sight of its own employees. Its headquarters office incorporates one of the most complete health programs to be found in such an organization. As a result, the 140 statisticians, artists, editors, librarians, engineers, etc., who comprise the staff are an unusually healthy and efficient crew.

A model dispensary serves as center for the health activities. Its main purpose is to enable the staff to keep in the pink of physical condition, but it is also equipped to treat illnesses and minor injuries. Among the special facilities are two short-wave diathermy units and an ultra-violet sun lamp. With these machines, hundreds of treatments are given every month. The usual stock of pharmaceutical supplies and general medical equipment is, of course, provided.

A graduate registered nurse is in constant attendance, and in a typical year as many as 7,000 consultations and treatments may be given. One day a week, the staff physician holds office hours in the dispensary, and he is on call for any emergency.

Specialists have examined the eyes, ears and teeth of all employees. These examinations have revealed that the staff as a whole is somewhat healthier than average, though far from perfect. Apart from a few cases where dangerous conditions were disclosed, one of the main values of these examinations has been to

*"Defense Training Courses: Engineering—Science—Management. U. S. Office of Education offers special courses at Evansville College through Purdue University with the Scientec Club of Evansville acting as an advisory Council." The subjects include: Mechanism Drawing; Jigs and Fixtures; Strength of Materials; Electrical Instruments; Steam Power Plant Equipment; Distribution and Transmission of Electric Power; Metallurgy; Planning and Control; Plant Layout; Applied Engineering Mathematics; Plastics in Construction; Elementary Chemical Engineering; Protective Coatings on Materials; and Industrial Safety. COLONEL DOBBINS writes: "There is a practical approach to this type of work not often attained or even realized by many industrial medical men, probably from the common lack among them of actual inside shop contact. . . ."

emphasize to the employees the importance of regular check-ups.

Before joining the staff of the National Safety Council, all applicants must take pre-employment physical examinations, including Kahn tests. Re-examinations are made annually, more often if indicated. Tuberculin tests, vaccination for small pox, and oral cold vaccines are available at no cost.

Persons with high or low blood pressure are checked every three months as a matter of routine, as are cases where the weight is seriously above or below normal.

Detailed confidential records are kept on the medical history of every employee. A glance at this information tells the exact physical status of any person. A number of the staff members have even gone so far as to have their blood typed and recorded, for possible emergency reference.

ALTHOUGH the health program is centered in the dispensary, it is interwoven with the whole work scheme. Throughout the office, the goal is to provide the most healthful and efficient working conditions possible.

Individual pitchers of fresh drinking water, for example, are delivered twice daily to each desk. Alongside three thermostatically controlled drinking fountains are supplies of salt tablets for hot weather use. In winter, each general office has an electric humidifier which throws a fine water spray into the air, removing the characteristic dryness of artificial heat, eliminating static electricity, and promoting general health. The humidifiers are supplanted by electric fans during the summer months.

Special correct posture chairs are used throughout the office. These chairs, which are adjusted and checked regularly for each individual, enable the employees to work more comfortably and efficiently, with healthful posture and reduced fatigue.

Lighting fixtures are checked periodically. As a result of a recent survey, indirect fixtures have been installed throughout the office. In locations requiring especially close work, fluorescent fixtures are now used. Venetian blinds are employed on all outside windows to reduce glare or shadows.

In the stenographic department, where there is a battery of more than 25 typewriters constantly pounding away, noise has been brought under control by sound-deadening ceilings. The conference room and photographer's studio are provided with special ventilating systems to carry off stagnant air or harmful fumes.

Special committees have been appointed to look after the recreation, as well as the health, of the staff. Golf, bowling and table tennis are regular phases of the athletic program, and picnics, skating parties, etc., are held from time to time.

Practically all members of the staff are enrolled in a plan which provides free hospital care in the event of illness or injury. In addition, all employees participate in a group insurance policy which includes both life insurance and health and accident benefits. Retirement-pension privileges have recently been inaugurated.

Courses in first aid, under the supervision of the American Red Cross, are given periodically, and all members of the staff are encouraged to participate.

IN INSTITUTING this extensive health program for a relatively small staff, the officers of the Council were well aware that this was a pioneering venture. The program, however, is now a fundamental part of Council operations; it has been found to pay good dividends. The management, employees and persons in close contact with the Council are in agreement that the level of morale and efficiency among the staff is in large measure attributable to it. Some intimation of its success can be gained from the fact that over the past three years, employees have averaged annually only 2.4 days absent on account of illness.

Credit must first of all go to the management of the Council who were far-sighted enough to foresee the wisdom of such a program. To the physician, and the nurse, who have contributed generously of their services and have gained the confidence of the staff, must also go much praise. Yet the program could not have been successful without the full cooperation of the staff. They have demonstrated in countless ways their deep appreciation of the efforts which have been made.

Occupational Diseases of Bones and Joints

LUDWIG TELEKY,
New York

AMERICAN industry, its workers, and the American youth are experiencing great changes in the course of the national war effort. There will be now a greater development of certain special industries, a re-employment of men unemployed for a long time, and the military training of the younger generation.

It may be advisable, therefore, to survey certain diseases of bones and joints which can develop in the course of these changes. Some of them have not been taken into consideration as much as damages of other organs up to now in this country, possibly because these organs—bones and joints—seem more resistant to occupational damages (although they play the most important role in accidents), or because some of the injurious circumstances have not existed here to any large extent.

There are various injuries affecting bones and joints in certain occupations now developing in the armament industry, using certain poisons; and there are other injuries possibly caused by overstraining of men who, from long unemployment, are not accustomed to hard work, and of young men, caused by military training itself.

We give here a short survey of these injuries to the skeletal system; but, to be complete, we will also briefly refer to all the other occupational damages to bone and joints as well.

IN EVERY textbook there is a description of phosphor-necrosis, the well-known suppuration of the jaw bone, first discovered by Lorinser and Obermayer in Vienna in 1845. This is not the effect of the direct influence of phosphorus vapors on the jaw. On the contrary, the chronic inhalation of phosphorus vapors leads to changes in the whole skeleton, to sclerotic osteitis and periostitis, a condition Wagner, Rose, Schuchart and others, as myself,[1] discovered 30 or more years ago, and as Michaelis[2] has rediscovered now. These changes in the bones render them susceptible to pyogenic bacilli also. The jaws, being steadily in contact with those bacilli—remember the frequency of periostitis and pyorrhea alveolaris—bear most frequently the consequence of phosphorus, with effects on the bones in the form of periostitis and osteomyelitis of the upper and lower jaws, the typical "phosphornecrosis" (Figs. 1 and 2), which finally leads to extrusion of large necrotic parts of the jaws. Many observations have taught that the process cannot be healed by resection of the affected parts of the jaw, because, some weeks later, they begin to suppurate again. The only useful method of treatment is estab-

Fig. 1.
Phosphornecrosis of the upper jaw.

Fig. 2.
Phosphornecrosis of the lower jaw.

lishing drainage for the pus and extracting the necrotic material.

The sclerotic changes in the bones lead also to greater fragility and, therefore, to spontaneous fractures, especially of the femur.

Phosphornecrosis was widely spread in match factories, using white (yellow) phosphorus in producing matches. After ceasing the use of white phosphorus in this industry the illness almost disappeared. Only several cases arose later in the manufacturies of firework implements in this country, and a few, and milder, cases still arise in the factories producing phosphorus and in factories using it in the production of certain alloys. In the growing war industry this danger must be remembered, in so far as phosphorus may be used in alloys.

Another disease, always rare and which now has disappeared altogether, is the osteitis of mother-of-pearl, which Englisch[3] found in 1869 in the young turners of mother-of-pearl in Vienna. It has been observed in almost 40 cases, with pain and swelling in various bones, in long, short and plane bones. The picture is that of a sub-acute osteomyelitis, but in none of the cases has the process led to formation of sequesters or suppuration. The swelling disappears slowly.

IF THESE diseases seem to belong more to the past, another illness is connected with the most modern evolution of industry. This comprises the radiation osteitis, jaw necrosis and osteosarcomas, discovered by Americans, and especially by Harrison S. Martland,[5, 6] as occupational diseases in the manufacture of luminous watch dials, on which colors containing radium were used very carelessly. The first symptoms were seen in girls who painted luminous dials for at least a year. Four to six years afterwards they had fallen ill with jaw necrosis and anemia. The authors thought at first that the necrosis might be due to the direct effect of radioactive substances on the gums and between the teeth, activating and increasing the bacterial virulence. But Martland, after further observations, demonstrated that the destructive processes occur also in other bones, due to osteitis; and he now interprets this type of jaw necrosis the same way phosphorus necrosis (jaw) was interpreted above —as the consequence of changes in the whole skeleton. Workers who escaped necrosis and anemia and often spent six to seven years after exposure in good health, began to feel pains in the bones, especially in those subjected to weight, pressure and trauma (head of femur, spine, pelvis). Osteosarcoma was finally found to develop, producing metastases in various other organs. If armament manufacture causes a larger use of luminous paints, every precaution will be necessary to avoid damages in producing and using these paints.

Americans have also taken the first steps in the detection of another bone disease. Black and McKay[7] studied and described "mottled enamel" in Colorado, a disease of the teeth among the children of certain districts. Churchill[8] first established (1931) that "mottled enamel" is caused by a relatively high fluorine content in drinking water. In Italy and Switzerland bone diseases have been found among cattle near a superphosphate factory and aluminum works. Bartolucci,[9] and Cristiani and Gautier[10] associated this disease with the fluorine compounds in the waste gases from the works.

In the aluminum factories these gases result from the cryolite melting baths in which aluminum is made. The mineral cryolite, Na_3 Al F_6, is found in workable quantities only at Ivigtut in Greenland. The material from the quarry is brought to a factory in Philadelphia, and to another in Copenhagen, Denmark. Here it is crushed, dried and packed. The dust hazard in the work is imminent. Gudjonsson,[11] in Copenhagen, was the first to establish the bone diseases as an occupational disease. A large and exhaustive book on fluorine intoxication has been published by Kay Roholm.[12] All the workers of the factory in Copenhagen complained about the dust; more than half of them had gastric symptoms, a feeling of stiffness, and indefinite or localized rheumatic pains. X-ray examinations showed changes in the bones in four-fifths of them. The affection attacks all bones, showing a preference for pelvis (Fig. 4), spinal column (Fig. 3), ribs and sternum. It is a diffused osteosclerosis with a pathological formation of bone—a considerable new formation of bone and a considerable calcification of the periosteum and the ligaments. Clinically the mobility of the spinal columna was restricted. In severe cases there was practically a complete rigidity of the entire spine.

This illness has been found only in the single factory decomposing cryolite in Denmark. The second factory handling cryolite in this manner is in Philadelphia, but there are no reports, and no investigations of the illness have been made in this factory. Cryolite is used in the fabrication of aluminum in electric furnaces, and the men handling the bags with cryolite, and putting the cryolite in the ovens, have to be protected against this dust also. Increasing production of aluminum for building airplanes may cause a larger use of cryolites, and protection of the workers against this dust is also necessary.

Fig. 3.
Column of male cryolite worker, employed 24 years. (Left) Seventh cervical, third lumbar vertebrae, side view. Chalky white bone, uneven surface, severe ligament calcifications. (Upper right) Transition from pars thoracalis to pars lumbalis. Complete osseous connection between corpora. (Lower right) Pars thoracalis seen laterally and posteriorly. Irregular stalactiform ligament calcifications. (Kay Roholm: Fluorine Intoxication. H. E. Lewin & Co., Ltd., London, 1937)

The affections just mentioned are caused by chemicals and rays associated with certain industries, which, as they are increased by armament work, will continue to show a certain occurrence.

THERE exists another illness of joints and bones of a very specific nature; it is caused neither by chemical agents nor by direct influence on the skeleton; it is the skeletal lesions of caisson disease. These changes were described first by Bornstein and Flate (Germany), and the American, Bassoe, in 1911; but they were then nearly forgotten until the middle of the fourth decade of this century, when Americans and Germans described this illness again.

The cases published show that as a rule pains in legs, arms and hips develop after a fast decompression; but they do not disappear within a few days as do the usual "bends." There develops a slowly increasing stiffness; often the patient comes to the hospital some years later when his suffering has reached a high degree. But it may be, in some cases, that the illness is the effect of damages after several decompressions. It seems that the hips are affected most frequently—at least it is especially because of the disturbances in these bones that the patients used to come to the hospital, though there are also changes in humerus and tibia and the corresponding joints.

As to the x-ray findings, we follow especially the instructive publication of S. C. Kalstrom, C. C. Burton, and D. B. Phemister. The roentgenogram shows necrotic areas in the diaphysis of the long bones with calcified or ossified zones of demarcation, often much more numerous and extensive than in other cases of necrosis. If the necrosis is located in the epiphysis and bordered on joints, varying amounts of collapse of the weight-bearing portions are to be seen. In the head of the femur or the humerus the necrotic lesions may break down and be invaded and eventually replaced by new bone or fibrous tissue. Involvement of articular cortex and cartilage leads to the slow development of arthritis deformans, with or without osteocartilagenous loose bodies.

Certainly these changes are the consequence of nitrogen gas, liberated in the tissues in decompression after caisson work. "Uncertainty prevails," according to the authors named, "as to whether the necrosis was produced by nitrogen gas obstruction of end arteries of the bones by embolism, or by direct pressure on blood vessels and other tissues after liberation from solution in the fat of the bone marrow, or in some other unexplained way."

MORE widespread, and much more important, however, are the injuries to the skeleton caused by over-exertion. Here may be first mentioned the hands

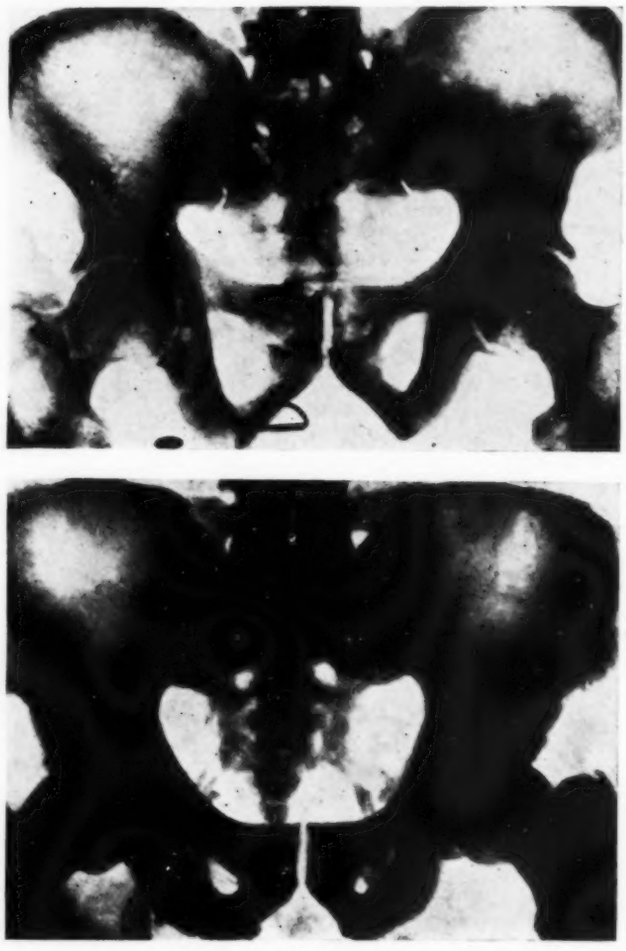


Fig. 4.
(Upper) Roentgen picture of pelvis, taken about a year after leaving factory. Osteosclerosis of slight second phase; increased density, blurred contours. Male cryolite worker, 51 years old, employed nine years. (Lower) Roentgen picture of pelvis, osteosclerosis of third phase: Greatly increased density irregular and blurred contours, ligament calcifications. Male cryolite worker, 55 years old, employed 25 years. (Ref. same as Fig. 3.)

Fig. 5.

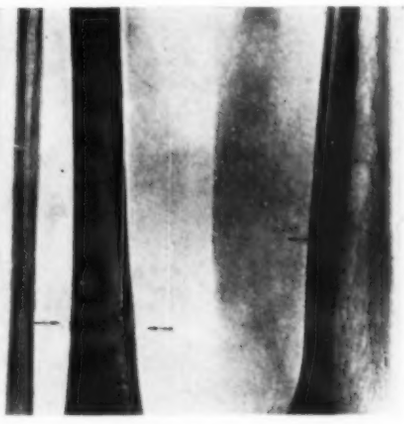


Fig. 6.

Fig. 7.

(Left) Swelling of foot in marching. Fracture of the third metaphalange. (Asal. Veroffentlichungen aus dem Gebiete des Heeressanitatswesens. Heft 104.)
(Center) Fissures in fibula and tibia. (Asal. Archiv. f. klin. Chirurgie. Bd. 186, 1936.)
(Right) Fissure of the trochanter femoris. (Ref. same as Fig. 5.)

of the heavy workers showing characteristics (but not truly pathological) changes. The fingers are deviated in the basal joints to the ulnar side. Other widespread but already pathologic changes are the curvatures of the spinal column, the scoliosis of the porters, or the kyphosis of the clerks — now rarer than in former times, because heavy burdens are moved mechanically and because the clerks have shorter working hours and a certain compensation by sports.

More important are the deformations we call "x"-legs and "o"-legs. The history of these deformities is closely connected with the history of manufacture. We find them at the beginning of the past century under the name "weaver-legs," because textile work was the first carried out in factories with modern machinery, involving overwork of children and juveniles. Later we find the expression "factory legs," and at the beginning of this century "baker-legs," telling of extremely long working hours and their injurious influence on juveniles. Now "baker-legs" have almost disappeared in the trade.

It is certainly the over-exertion, the mechanical over-strain by heavy work and standing too long, of young people which creates these deformations. Similar deformities, but not identical with "x"- and "o"-legs, and also spontaneous fractures, occurred in Germany during the "hunger-winter" of 1918-19, among boys and girls 14 to 19 years old, if they had to work standing and walking for long hours (Hasse,[13] Beninde[14])). Bad nourishment and over-strain operated here together.

Factory-legs, and baker-legs seem to have disappeared today. I do not know if they were ever observed in this country, but their existence abroad in former times and the bone affections after the world war show us how necessary it is to protect juvenile workers in time of emergency. We must also mention here the "coxa vara." It is found mostly among young male workers, many authors think as a consequence of carrying heavy loads, while others believe it due to many small traumas, "micro-traumas."

A certain group of injuries by over-straining is observed especially in military training, and in military service, also. One of these injuries, known for decades among soldiers, is the "swelling of the foot in marching." This is a swelling of the dorsum of the foot, painful to pressure of the metaphalanges, especially of the second and third. It occurs after extensive marching, particularly with recruits. By using x-ray pictures we now know that there are "infractions" of the metaphalanges (Fig. 5), most frequently of the third one. After World War I there occurred scarcely 20 marching swellings in the professional army of Germany, with its well-trained soldiers serving a long time. In the last years, however, as a consequence of the short and intensive drill, Asal[15] has seen in one military hospital 153 marching swellings in the course of two years.

Another effect of over-exertion is what formerly (before the time of x-rays) was called "over-straining periostitis" of the tibia. We now know that it consists of a thin fissure which as a rule does not penetrate the bone and is situated a handbreadth under the knee, more rarely in the middle of the tibia.

Similar infractions have been found in the fibula (Fig. 6), but neither here nor in the femur nor its neck (Fig. 7) are they frequent. But it also happens that from an infraction or fissure a true fracture with dislocation may develop.

The origin of these fissures is not an accident or a sudden trauma. They are the effect of many "micro-traumas" set by repeated over-straining. We observe the same events in dead material. If a stick of wood or steel is loaded repeatedly with only half of the load which as a whole would break it at once, it finally breaks down.

These observations, made in Germany, show us that certain restriction in strain is necessary in military training, even if the training has to be completed in a short time. On the other hand, it is necessary that army physicians, and officers, too, know the occurrence of infractions, because if neglected and not treated cautiously a very slight infraction may develop into a true fracture.

I want to mention here another military disease, the drill-bones and the riding-bones. In former times these were seen more often; now they are very rare. They were bony enclosures in the muscles at places where repeated irritation had led to bleeding and inflammation. In the German army they were found as a result of the repeated contusions made by the gun in the delta or pectoralis muscles of the chest. The riding bones are as a rule situated in the adductor muscles of the thigh; they can be as long as 15 cm.

The same deterioration of the bones by micro-traumas as mentioned above, causes the "shovel sickness." It was Bourgougnon[16] who first described this in 1875. Now it is frequently observed and studied in the extensive road-making operations in Germany. Three German authors [19, 20, 21] published 462 cases; there must have occurred several thousands; there are 78 cases published in Switzerland and 12 cases from

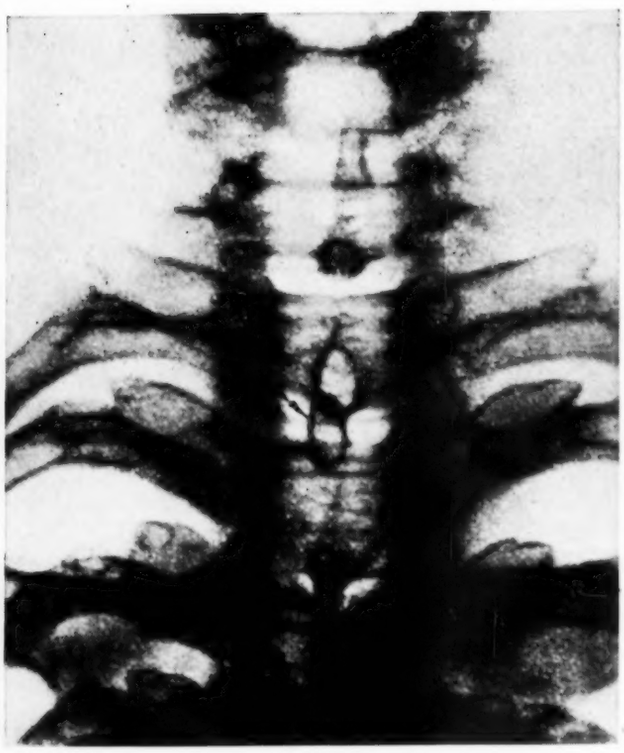


Fig. 8.
Shovelers Fracture of the processus spinosus. (Matthes, Archiv. f. orthopad. u. Unfallchirurgie, Bd. 37, 1938.)

Western Australia,[30] arising under the same conditions as the German cases, namely from employing untrained men previously unemployed for long periods. But this affection is certainly as old as the pyramids. It consists of fracturing one or more vertebral processes of the lower neck and upper breast vertebrae. In nearly three-fifths of the cases the spinal processes of the first thoracical vertebra and sometimes those of two or three other vertebrae break off. This accident occurs where rigorous and especially sudden movements of the arms are exerted, as is particularly the case where the burden is shoveled with a swing into a lorry or wagon. Often hours or days before the fracture occurs the workers feel pain between the shoulders. They call this "honk-of-the-motor-illness" on the large motor highways (Reichsautobahnen) in Germany. At this stage x-rays demonstrate pathological changes of the bone. Later, if work is continued, violent pain sets in suddenly; a crack is heard. The fracture has been caused by a further throw with the shovel, but often without special exertion. The man retains then a characteristic posture — the head is bent forward and kept immovable because each movement causes pain. Head and neck are now held in the same position as a wether holds his head, and the French, therefore, call this condition "mouton." As a rule the work must be interrupted immediately; rarely is it continued till later on or even the next day. The pains induce all movements of the shoulders and the arms to be executed very slowly and cautiously. In thin lean persons one may see a slight groove at the site of the broken spinal process; on palpation the deeper-positioned spinal process is perceived, always sensitive to pressure, and sometimes crepitation may be heard (Fig. 8).

It is indispensable to have x-ray pictures taken carefully by an expert, both in sagittal and lateral directions. Anatomically the alteration of the spinal process and finally its fracture are produced by tearing of the trapezoid and rhomboid muscles which insert on one side on the spinal processes of the neck- and breast-vertebrae, and which have here their support for the movements of the shoulder. In heavy work the muscular stress upon the processes is very strong and so produces the changes.

The treatment should be conservative, without polypragmasia; a week or more of bed-rest with application of heat is advocated. I do not think that a dressing for fixation of the shoulders serves its purpose, nor an operation. As a rule these fractures heal with pseudarthrosis. Incapacity to work for six to eight weeks is observed; only easy work should be done for months because of the danger of relapse. The physician must avoid making the patient anxious; he must not speak of a fracture of the vertebral column; he must tell him that only a little process is broken, which has nothing to do with the whole column or the spinal cord. This injury entitles to compensation for the time of disability.

All pertaining conditions for this injury are given in road building — by hard shoveling work and the personnel conditions. It depends on the more or less well-trained organism of the workers for heavy work and on the degree to which the skeleton is weakened by malnutrition, on the length of time the men were unemployed before, on hard and unaccustomed labor by men coming from various professions, and on various constitutional types. Therefore the number of cases of shovel illness was very large in Germany and would be here, also, if the re-employment of the unemployed for shoveling were not accomplished with all necessary precautions. Good nutrition and avoidance of overstrain are important. The latter must be achieved by avoiding excessive flinging movements, by proper construction of the shovels (not too large), and of the lorries (not too high), and avoiding too long working periods.

THIS injury has existed at nearly all times; but there is also a very modern type of injury caused by working with mechanical instruments, the use of which is not older than 35 years—the jackhammer and other pneumatic tools, as chisels and drills. In the beginning the workmen and the medical men thought that the shaking caused by these tools would evoke disturbances of the organism of the whole nervous system. Fortunately that does not happen, although the use of pneumatic tools is widespread and the modern jackhammers have a weight up to 50 pounds and make up to 4,000 strokes a minute. But under certain circumstances the tools damage the vessels, the muscles, the nerves, and most of all the joints, of the

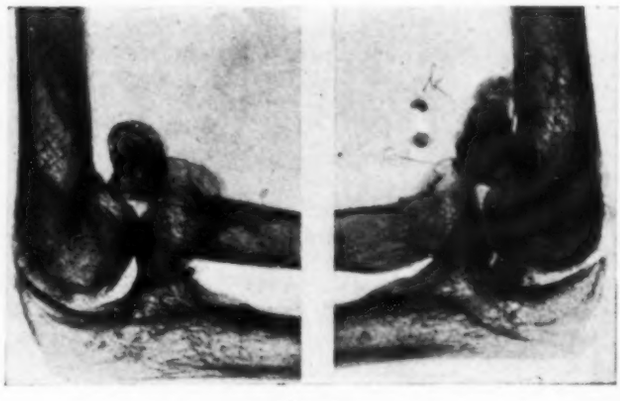


Fig. 9.
Damages of the elbow by jackhammer-work. (Burckle de la Camp. Zeitschrift f. arztliche Fortbildung, Bd. 35.)

arm which holds them. The vibration damages the blood vessels of the fingers, particularly of those which hold the tool itself, not the hammer-shaft.[22, 23] The fingers get white in the cold, there is paresthesia, sometimes (rarely) gangrene develops. The damage to the joints is not a consequence of vibration; it is the consequence either of the strain in catching the strokes or of the strokes themselves. Rostock[27] has first given this explanation and made this differentiation. Holding the tool in its position and catching the blows, the muscles must be continuously stretched and, therefore, reactive growths originate, visible in x-ray photos on the parts of the bones where the muscles arise. On the other hand, the strokes press the ends of the bones in the joints together; following subchondral necrosis leads to osteochondritis dissecans, or to changes of the joint surfaces. Whether changes arise depends on the severity of work, the kind and weight of hammer, the hardness of the material worked upon, the working time, and, perhaps, on the individual disposition.[24, 29] The changes which might arise depend on the kind of work, on the method of holding the tools, on personal habits. Most frequently the elbow joint is damaged. Typical here is (Fig. 9) an "olecranon-spur" (elbow spur). The triceps inserts on the olecranon. In the place of the humerus where the brachialis is attached there are often two bean-shaped growths, often some growths also at the "tuberositas radii" where the biceps (the most important muscle in bending the forearm), is inserted and on the point of the processus coronoides ulnae, where a part of the brachialis is inserted. As a consequence of the pressure a change at the capitulum radii, a marginal roll, can be seen, which the x-ray photos show as an indent overhanging. Free joint bodies may also be detected. Rare cases show changes in the shoulder joint, which grind off the head of the humerus; in the wrist necrosis of the os lunatum occurs.[26] In workers acting atypically, changes arise even on the legs and in the breastbone.

At the onset the pains are very slight, and we are often astonished at the great changes, shown in the x-ray, which do not hinder the men working. Sometimes the pains appear every day at the beginning of work, but disappear during the day almost completely. After finishing work, they arise most impetuously.

The time for the gradual development of changes depends on the circumstances mentioned above. We see changes after two years and joints without any change after 10 years, corresponding to the variability of all circumstantial factors. We must insist that the sickness may make progress in several cases, even though manipulation has ceased. For the diagnosis, and especially for the differential diagnosis with rheumatic diseases, x-ray photos of all the larger joints are indispensable. If all the joints show changes, we do not have jackhammer illness but rheumatism. It is characteristic of the illness caused by pneumatic tools that the big joints of the upper extremities are altered exclusively or to a greater extent, and that here the alteration is either only on one side or at least more developed on one side. Most frequently, but not always, the right elbow is the joint mostly changed.

It may be added that the overstrain and the pressure by pneumatic tools also lead to atrophy of the small muscles of the hand, but very rarely of the arms. In rare cases a progressive spinal muscle atrophy arises.

As these pneumatic tools are used more and more and their weight and the number of strokes per minute increase, it is necessary to protect the workers against these injuries. Just now there has been no success attained in avoiding these damaging effects by technical improvement of the tools, although many attempts have been made. Useful measures are periodic examination of the endangered joints by x-ray pictures once a year, and abstaining from work with these tools if slight injuries are seen.

This jackhammer disease is largely an arthritis deformans. Other forms of arthritis deformans are also produced through hard work, such as the malum coxae senile. This is an occupational disease of the hip of hard working old laborers.

In conclusion I wish to mention the rheumatic changes. Investigations have shown that sudden changes in the temperature are very important in the etiology of this disease. Naturally it is not possible to avoid work in hot places, but it is possible to protect the worker against heat by suitable installations—screens, and the blowing in of cool air between the worker and the source of the heat or on the worker himself. By proper construction of the building it is also possible to avoid the necessity for the worker, after working in a hot place, to go through open air or cold rooms to locker rooms or washroom. Showers of a well-regulated temperature are also useful; the change of working clothes should be self evident. It is very easy to provide the necessary fittest installations in newly constructed or enlarged plants.

Bibliography

1. TELEKY, L.: Die Phosphornekrose. 182 Seiten. Wien, Deuticke, 1907.
2. MICHAELIS, P.: Das Wesen der chronischen Phosphorwirkung und der Phosphornekrose. *Arch. f. Gewerbepath. u. Gewerbe hyg.*, 7:477-285, 1937.
3. ENGLISCH, I.: Ueber die multiple rezidivierende Knochen-Entzündung. *Wien. med. Presse*, Nr. 15-24, 1869.
4. GUSSENBAUER: Die Knochen-Entzündung der Perlmutter-Arbeiter. *Arch. f. klin. Chir.*, 1875.
5. MARTLAND, H. S.: Occupational Poisoning in Manufacture of Luminous Watch Dials. *J.A.M.A.*, 92:466-473, 552-559, 1929.
6. MARTLAND, H.W.: The Occurrence of Malignancy in Radioactive Persons. *Am. J. Cancer*, 15:2435-2516, 1931.
7. BLACK, G. V., and McKAY, F. S.: Mottled Teeth. *Dent. Cosmos*, 58: 129, 781, 894, 1916.
8. CHURCHILL, H. V.: Occurrence of Fluorides in Some Waters of the U. S. *Indust. & Engin. Chem.*, 23, 996, 1931.
9. BARTOLUCCI, A.: Casi Interessanti di osteite malacica nei bovini. *Mod. Zooiat., Parte Scient.*, 23:194, 1912.
10. CRISTIANI, H., and GAUTIER, R.: Le fluor on point de vue de l'hygiene industrielle. *Ann. d'hyg.*, 3:210, 1925.
11. GUDJONSSON, S. K. V.: Kryolitherkrankung. *Aerztl. Sachverst.-Zeitung*, 41:155, 1935.
12. ROHOLM, KAY: Fluorine Intoxication. H. K. Lewis & Co., London, 1937.
13. HASS, I.: Ueber der zeit auftretende eigenartige Spontanfrakturen bei adolescenten. *Wien. klin. Wochnschc.* 32:677-682, 1919.
14. BENINDE: Die Verbreitung der durch die Hungerblokade hervorgerufenen Knochenerkrankungen unter der Bevölkerung Preussens. Veroffentlichungen aus dem Gebiet der Medizinalverwaltung, X. Band. Heft 3.
15. ASAL: Ueber Belastungsschäden im Knochensystem bei Soldaten. *Arch. f. klin. Chir.*, 186:511-522, 1936.
16. BOURGOUGNON: *These de Paris*. 1875, Nr. 340.
17. MAGNUS, G.: Ueber Dornfortsatz-Brüche. *Monatsch. f. Unfallh.*, 40:199-203, 1933.
18. WACHS, E.: Ueber Abrissfrakturen in den Dornfortsätzen der Wirbelsäule. Fortschr. a. d. Geb. der Röntgenstahlen, 52:261-277, 1935.
19. DEBUSCH, L.: Die Schipperkrankheit und ihre Behandlung. *Arch. f. orthop. Chir.*, 37:223-231, 1936.
20. BAUER, A., and KOEPCHEN, J.: Die Schipperkrankheit. Arbeitsmedizin, Leipzig, I. A. Barth., 1937.
21. MATTHES, H. G.: Unsere Erfahrungen bei der Schipperkrankheit. *Arch. f. orthop. u. Unfall-Chir.*, 37:232-245, 1936.
22. HAMILTON, ALICE, and others: Effect of Airhammer on the Hands of Stone-cutters. Labor Statistics Bulletin 236, 1918.
23. HAMILTON, ALICE: A Vasomotor Disturbance in the Fingers of Stone Cutters. *Arch. f. Gewerbepath.*, 348-358, 1930.
24. SOMMER, R.: Durch Pressluft gesetzte Knochenschädigungen des Ellobogengelenks und ihre Entstehung. *Bruns Beit. z. klin. Chir.*, 161:37-46, 1935.
25. HAEHNER: Ueber Gelenkschädigungen durch Pressluftwerkzeuge. *Monatsch. f. Unfallheil.*, 37:561-570, 1930.
26. WETTE, W.: Die Lunatum Necrose als Unfallfolge und Berufskrankheit. *Arch. f. orthop. Chir.*, 29:299-319, 1931.
27. ROSTOCK, P.: Durch Arbeit mit Pressluftwerkzeugen hervorgerufene Veränderungen am Ellbogen. *Arch. f. orthop. Chir.*, 29, 264-293, 1931.
28. ROSTOCK, P.: Gelenkschäden durch Arbeit mit Pressluftwerkzeugen und andere schwere körperliche Arbeit. *Med. Klin.* 38:341-343, 1936.
29. DE LA CAMP, BURCKLE: Ueber die Erkrankungen der Muskeln Knochen und Gelenke durch Arbeit mit Pressluftwerkzeugen. *Med. Welt.*, 11:1348-1351, 1937.
30. HALL, R. D. McKELLAR: Clay Shovelers Fracture. *Bone & Joint Surg.*, 22:63-75, 1940.

Who's Who in Industrial Medicine

—*Individualist*—

THE members of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS are gathering this month for their Twenty-Seventh Annual Meeting. In that behalf all paths of travel lead to Cincinnati. Whether plan or coincidence, design or fortuity, this is eminently fitting and proper. In addition to all else that may have persuaded the committee on the selection of a meeting place, Cincinnati is the home of OTTO GEIER. And, having been his home since he was born there in 1874, it is one of those cities which — because of what was done in them and because of the men who did it—loom large in the history of industrial medicine, and of the A. A. I. P. & S. Contemporaries, of course, were similarly pioneering in other cities — Boston, Bethlehem, New York, Philadelphia, Rochester, Pittsburgh, Detroit, Chicago. Theirs, however, are separate stories; this is his. . . .

OTTO P. GEIER

For OTTO GEIER, and his place in industrial medicine, April is a month of significances. He was born in April, 68 years ago. It was in April, 1914, that he began the industrial affiliation which has become his career. It was in the same April that he met JOSEPH SCHERESCHEWSKY, then Medical Adviser, U.S.P.H.S., Office of Industrial Hygiene, and found a fellow-believer in the conviction already fixed in his own mind that safety and surgery, which at that time were the principal elements of medicine in industry, were not enough; that, like the two points of geometry which determine the line, they were evolving in only one dimension; that they needed the third and outside point, *prevention*, in order that the three lines then definable could become the boundaries of the whole area of health. It was in April, 1915, that he resolved to make articulate the suggestion coming to him on all sides from the doctors in industry: "Let's have an organization of our own!" It was in April, 1917, the month of war, that he and HARRY MOCK, then Chief Surgeon for Sears Roebuck, were appointed as industry's medical representatives to the Committee on Industrial Medicine and Traumatic Surgery of the General Medical Board of the Council of National Defense. It was in April, 1918, that he prepared, for that committee, the summary he gave the following month at Washington, of which FRANKLIN MARTIN, Chairman of the General Medical Board, wrote as follows: "A comprehensive report, covering about every phase of (industrial medicine) with details of suggested procedure, was presented by the prospective director, DR. OTTO GEIER." And now it is April again.

Those who set store by auguries and portents will tell you, as to the future, that an individual born under a certain sign will have certain characteristics. As to the past, you name the characteristics; they'll call the sign. Give them OTTO GEIER, and they'll call it correctly, for *his* sign was omen of the self-reliant, self-starting, aggressive personality; the traits it indicated were those of the complete and capable individualist.

GRADUATING M.D. from the Medical College of Ohio, at Cincinnati, in 1897, he spent his internship at Christ Hospital, after which came a postgraduate year at Worcester (Massachusetts) State Hospital, and another year, in pathology, at Boston City Hospital. Then, back in Cincinnati, in 1900, he set up his own office for general practice.

A while this seemed all-sufficient; his office was in the center of town, he knew hosts of people, and he was capable and likeable, although, perhaps, never too serious. It wasn't enough. Before he realized it he was looking into civic matters, mostly those relating to public health. One of them, and the one which more than any other appealed to his restless initiative, was that of the "dirty milk" which was the city's fare. Like so many situations which are everybody's business, this was nobody's, and nothing was being done about it. The clean-up, if there was to be a clean-up, needed a leader. He appointed himself, and for a time—long enough to become well known to most of the local politicians and office holders, and unpopular with all of them—he was both leader and led. Nothing daunted, he enlisted other doctors and together they investigated every nook and cranny, not only of the milk situation, but also of certain city departments—some of which could not stand comparison with their counterparts elsewhere. By 1906 he was thoroughly familiar with milk matters in many other communities, and even more thoroughly disliked in milk circles in his own. But the city was getting clean milk. In April, 1907, at considerable expense to himself, he succeeded in calling a conference of the milk commissions of the United States. These met the following month at Atlantic City, along with the A.M.A. Among the nearly 500 present — hygiene, sanitation, and public health workers — was Henry L. Coit, originator of the certified milk which is now so universal. The outgrowth of this meeting was the organization of the American Association of Medical Milk Commissioners. Coit said later that, as to pure milk, "If I was the apostle, OTTO GEIER was the epistle." For years thereafter DR. GEIER was Secretary of the local Milk Commission. During the first seven of these years the membership of the Association of Medical Milk Commissioners grew from 12 to more than 80.

This milk fight was good experience for the young man; he got results, and he learned not only how to get them, but also that within himself he had the qualities

and characteristics that were able to get them. And so, since milk wasn't the only problem he had encountered which he thought needed solving, he plunged into a tuberculosis program for the city. This, too, was a battle, and here again he was quickly in bad, this time with both the politicians and the medical officials. Believing he was right, however, he went ahead, characteristically, in his own way. If this involved arguing, he argued; disputing, he disputed; crashing meetings where he wasn't wanted, he crashed. Finally he obtained what he was after, which was, in substance, a saner and less opinionated attitude on the part of the authorities regarding tuberculosis, and some little progress toward the rule, rather than the exception, of non-partisan boards of health and health officers. In 1909, he went on to a similar intensity of involvement in the affairs of the city's Department of Charities and Corrections. This interested him greatly. Its difficulties were essentially those of organization; social work needed to be centralized; methods of handling dependent and delinquent children were, to say the least, archaic and unenlightened; public means for recreation, such as playgrounds, etc., were still curiosities. Indeed, it interested him so much that, with 1912 beginning, he gave up his practice and took the full-time job as Director of the Department. During the next two years he confirmed his knowledge of politics; but by this time his reputation for persistence was such that officialdom helped rather than hindered. Thus he was able to bring order into the department's chaos; humanity into its routines. One outstanding achievement of his tenure of this position was the establishment, locally, of a financial federation of social agencies. This plan, original in Cleveland in 1913, shortly became the Community Chest. Cincinnati's immediate adoption gave the movement a powerful impetus.

Part of the temperament of the individualist is that he likes to go from one result to another; doesn't want to linger in a job when he's fully taken its measure. So, after two years as Director of Charities and Corrections, he began to wonder "What next?" This was early in 1914. He thought of returning to the quiet of his practice. There were attractions, but he realized that, all too soon, some other matter of more than individual importance would tempt him again. By now he knew his own capabilities, and had lived long enough with himself to understand his own heart. He was well aware that if, for example, a patient came to him with an ailment of occupational origin, he wouldn't stop with the ailment but would simply have to go after the cause. In his more-or-less crusader background there had been many contacts with effects peculiar to the hazards of work. And he had studied much and deeply regarding the prevention which, as to occupational diseases, cried out for both "apostle" and "epistle." But such things weren't public affairs; they were private; he couldn't barge in on them as he had on milk and tuberculosis and charities. Back again, to "what next?"

MEANWHILE, as is often the case, the opportunity was preparing itself for the man who — while it was developing unknown to him — was getting ready to meet it. Among the city's successful and growing concerns, the Cincinnati Milling Machine Company, after a quarter-century of public-spirited enterprise, was planning an employee-spirited move, the inauguration of a service department. He was asked to become its Director, in charge of labor relations, medicine, safety, and personnel. This was what he wanted. He could practice his beliefs; he could crusade by example.

He began cautiously, with study. Among his early investigations was a survey of industrial medicine as it then was. He found it a scattering of medical departments throughout the country, headed by that pioneer battalion of medical directors and chief surgeons, who each was a regiment in himself, and who all are the backbone of industrial medicine as it now is. Some of them had begun even before the turn of the century; many were more recent; all were working as they had always worked, individually — meeting and solving their problems, for the most part, without much opportunity to mingle, and few contacts with their fellows except by hearsay. From the organization standpoint there was little to tie to. The newly-formed National Safety Council had acknowledged the subject; a feature of its first congress (1913) had been Andrews' talk on occupational diseases. Later in 1914 the Council would have an industrial hygiene session at its second congress; and it would go on from there to a substantial and helpful recognition of the field and its problems. And the A.M.A. had a section on preventive medicine and public health. But in January, 1914, that was about the extent of the organizational cognizance of industrial medicine.

The first move, then, was to get acquainted with the pioneers. Among the early trail-blazers, he spent considerable time with ANDREW HARVEY, whose identification with Crane Company's medical department dated back to 1896. Among the later pioneers, he lingered with A. W. GEORGE, who was then establishing himself as Chief Surgeon at Packard Motor. There were these and other visits in February and March; and in April he became, formally, Cincinnati Milling Machine Company's Director of Employee Service.

That was 28 years ago. As to how he handled the job, his department speaks for itself. Long recognized and often acclaimed for its demonstrated success as everything such a department should be, it is eloquent of his possession and use of the qualities that make up a real medical director.

The significance here, however, is that his department's record, and his as its head, cover 28 years. Did he stay so long because he had finally found a job that he was unable to take the full measure of? Was there enough in the duties of his department to absorb his abounding initiative? For a man of his qualities and temperament, 28 years in one position is a long time. But there he is, and there he has been; and it wasn't because of the job itself — for his mastery of that was quick and instinctive. Instead it was because of the relation of his job and his department to the whole picture of industrial medicine.

IT IS a part of the psychology of those developments of thoughts and ideas that sweep the years and leave a dent in history that the need brings forth the man. The sequel here discloses that the field, the science, the now-specialty of industrial medicine needed just such a man as OTTO GEIER at just the time he came into it. It was exactly the right moment for someone to appear who would be its aggressive spokesman, its completely partisan advocate, persistent and belligerent in its behalf. It needed the quality of forthright articulation that a man of his temperament and personality could give it.

Naturally, he stepped right in. Whatever ideas he may have had that he could crusade by example alone speedily went overboard; and it wasn't but a short time until he was the most aggressive, the most insistent, and undoubtedly the most argumentative of all who ever spoke in favor of the new field. No less, he was among the best informed. All this was characteristic, for he never did anything by halves. From then on, industrial medicine was his vocation to practice, his avocation to preach, and, if necessary in its behalf, his arena in which to agitate. Here was a field in which he

could give concrete expression to the interest in people which had attracted him to public health. It dealt with individuals in the mass and yet it emphasized the individual — for it was the science in which the individual had to be considered in definite personal relation to his place among other individuals. And thus, in the long view, it was a field which could merge the best of the social with the best of the scientific, in a manner wherein the future "best-for-all" would be woven out of the present "best-for-each." An outlook to engage the farthest thinker. . . .

It was natural, therefore, that he went to the second national safety congress in 1914, and began agitation for a Council health service. And naturally, too, he was present at the 1914 meeting of the A.M.A. section on preventive medicine and public health, and agitating again — with such good effect that he was appointed secretary of the section. In that capacity he kept on agitating, promoting the industrial aspects of the section subjects. This also was effective; the 1915 meeting was better attended than ever before, while the 1916 session, responding to the same kind of agitation, broke all previous records. In 1917 he was Chairman of the section. Meanwhile, as a result of his agitation the preceding year, the safety congress of 1915 turned up with a large meeting on health service; and, of course, he was presiding chairman. Among those in attendance were more industrial doctors than ever theretofore had assembled at one time and place. And opportunity beckoned again, for it was there that he and HARVEY, MOCK, McCURDY, SAWYER, CROWDER, PATTERSON, SHOUDY, FISK, SCHERESCHEWSKY and others went into the private session on the formation of a society of industrial physicians and surgeons from which the eventuality was that, later in 1915 — through the acts and over the signatures of the proper number of those who were then and there present* — the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS was incorporated in Illinois. Its first annual meeting was held at Detroit in 1916. Henceforth the medical world, increasingly from year to year, was to be industrial-medicine conscious.

As if this weren't enough to keep him busy, he found occasions to bombard the Surgeon-General's office in Washington on questions of public health, and to engage in a somewhat strenuous argument with Samuel Gompers on the question of employee physical examinations.

IT IS written that soon after the declaration of war in April, 1917, there met in Washington "a most interesting group composed of about 100 of the leading industrial physicians and surgeons." They were assembled to discuss the place of industrial medicine in the war effort. Naturally OTTO GEIER was among them; he was already a member of the Committee on Industrial Medicine and Traumatic Surgery of the General Medical Board.

In connection with his subsequent activities there, it is hereinabove noted that in 1918 there was reference to him as "the prospective director." Nothing came of it. Instead he went into military service as Assistant Surgeon, U.S.P.H.S. in charge of health matters, under AUSTRACHER, in the powder works at Anchor, Hamilton County, Ohio. There's naught in the record, but those who knew both OTTO GEIER and the Chairman of the General Medical Board will admit that two personalities as strong as these might easily and often disagree.

After the war he was less restless for a while; probably giving thought to some of the social inequalities which he so strongly believed should be somehow adjusted.

In 1925 he was made a member of the League of Nations Medical Commission and went abroad to study living and working conditions in foreign countries. While in Europe he stopped over at Ragusa on the Adriatic for a short vacation. As he boarded the ship to leave, he looked up at the deck above him and into the eyes of the lovely Austrian girl who, since 1925, has been Mrs. Geier.

With labor relations a part of his administrative work he was interested in the whole question of labor —organizations, contracts, attitudes, and conditions. His temperament, however, was too individualistic for him to give whole-hearted acceptance to the forms or the standards of the period; and he evolved some ideas which in the late 1920's were considered rather too advanced. This caused him to be criticized in certain quarters. Among those familiar with the activities of such organizations as the National Metal Trades Association, he was thought of as something of a socialist and spoken of as a good deal of an agitator.

This, however, was all true to the pattern. In his ideas regarding labor, as well as in a great many more of the matters and things concerning which he held strong convictions, he was, from the very first expression of his social consciousness, a man ahead of his time. If he was an agitator, he was a constructive agitator. That is proved in the fact that most of the things he agitated have come to pass. In all essentials of his beliefs the years have overtaken him.

It is inevitable that individualists, and especially those who are aggressive and articulate, translate same of their ideas into characteristically pungent aphorisms. Here are a few of his:

"The industrial physician works under a light; and it is like no other light in the world."

"There is a whole lot of symptomatology that doctors in general practice don't know about because they don't see it. The symptoms they have before them when they are finally called in, comprise usually the second or third set. Doctors know, of course, that there are pre-tuberculosis symptoms, but how many have ever seen pre-pre-tuberculosis symptoms?"

"It is good management to employ a good industrial physician; but it is exceedingly bad management to require a first-rate physician to report to a second-rate executive."

"The industrial physician can exhibit, without embarrassment to himself or his company, more interest in a wider field of human activity than any other physician, or any layman."

The last above is probably as good an explanation as any of the 28 years in one job. His interest in people is his major interest. Withal it is the collective interest that would be expected of a man whose hobby is social economics, yet it is continually and sincerely individualistic. This is inherent in his very genuineness. He couldn't be happy in any sphere in which he could not express it. And where is there a better sphere than a position in which one can work side by side with thousands of people whose economic lives and health lives make daily fresh demands on heart and brain alike?

IN ANY development as significant as that of industrial medicine, it is difficult to evaluate the work of each contributor all by itself. His place must be determined and the estimate of his work must be made with relation to the whole, for the complete history includes the name and the work of every man who had a part in it. In studying the men in industrial medicine one at a time, therefore, the fact that each definitely contributed and that his contributions were essential and valuable

*The Articles of Incorporation were signed, October 12, 1915, by ANDREW M. HARVEY, H. E. MOCK, J. C. STUBBS, C. G. FARNUM, WILBER E. POST, S. M. McCURDY, and T. R. CROWDER.

is persuasive to over-emphasis in the individual summary. The best method is to recite the facts and let the influence be inferred. These observations, while they have many other applications as to the subject of this sketch, have special relation here to an incident that occurred while the American College of Surgeons was beginning to think about establishing a Board on Industrial Medicine and Traumatic Surgery. Early in 1919, the College met in Cincinnati, and local doctors were selected to call at the hotels and drive the out-of-town guests to the University grounds, where some of the sessions were being held. DR. WILL MAYO and DR. WILLIAM KEEN of Philadelphia, of Civil War fame, were assigned to OTTO GEIER. DR. MAYO, in the front seat, was impatient and asked to be driven hurriedly, as he was anxious to get to the meeting. As a matter of conversation, then, he asked DR. GEIER what he was doing, and the latter replied in detail, with no effort, and probably no ability, to stay away from the general subject of industrial medicine. Arriving at the University, DR. MAYO suggested they leave DR. KEEN at the meeting place and drive around a while so they could finish the conversation. They drove around for an hour, and DR. MAYO didn't get to the meeting at all. Six months later there came an invitation to read a paper at the Seventh Annual Meeting of the College, the title to be "The Physician and Surgeon in the Industrial Crisis." DR. GEIER read it, before an audience of more than 2,000. He had been warned that the gavel would fall in 15 minutes, even if it came down in the middle of a word. At the end of that time, DR. WILL MAYO, presiding as chairman, brought it down, but he did it so unemphatically, that DR. GEIER went ahead and spoke for six minutes more, finishing his text. DR. MAYO said afterward, "It was a good paper." The A.C.S. Board on Industrial Medicine and Traumatic Surgery—which developed the Minimum Standards now so proudly approved in a thousand medical departments — was established in 1926.

DR. GEIER has held many positions of professional preferment. In the A.A.I.P.& S. he was Secretary, and later President. His memberships include also A.M.A., A.P.H.A., and the Conference Board of Physicians in Industry. For a time he was a member of Ohio State Medical Council. As a matter of life-long interest, he remains identified with the local social work organizations; and, as would be expected from his humanitarian background, he is nonpartisan in politics. His writings include numerous articles on industrial-medical and industrial-relations subjects—more, indeed, than he remembers, for he has neither file of his literature nor scrapbook of what else he has done. He is satisfied with the doing.

AND now it is April again. Not the month of blossom-time and rains; the Lady April comes this year as "Ate . . . hot from Hell—let slip the dogs of war." And in Cincinnati, as throughout the nation, industry teems with the manufacture of the implements of war—the Nation's Business, in which health is a duty and hygiene is patriotism.

In the fact and significance of this meeting of the A.A.I.P.& S., the last several decades of OTTO GEIER's career and the similar periods of the careers of the other leaders in industrial medicine to whom his city is host are inextricably bound together. Correspondingly early in the last war, they were a committee, gathering in Washington to find out what they could do. Now they are a great and powerful organization, doing effectively and earnestly what they themselves have learned to do and they themselves have developed the science of doing. In the midst of the need to keep on doing it, they are taking a little time, as it were, to touch home base; to renew the bond which, as it vastly expanded their number and the range of their activities, nevertheless drew them ever closer together. A good many of the "first hundred" will be there, to look back, with OTTO GEIER, over the long way the Association has come. The growth and development which so recently resulted in full and unequivocal recognition in both medical and lay circles has been their goal; the attainment of it is the epic of their years. Not that they are old. On the contrary, they are young enough to write another epic. It is well that they have been spared to do so.

Education in Industrial Health

IN ANY discussion of this subject the terms "industrial health," "industrial medicine" and "industrial hygiene" have a tendency to become confusing, and the need of clarification of terms used is obvious. The connotations of the words "occupational" and "industrial," in relation to disease, are evidence of the necessity of a careful analysis of terms used. Industrial medicine may be considered as a science which deals with prevention, cure and alleviation of disease as it affects gainfully employed individuals. The objectives of industrial medicine have been stated to be:

1. To fit every person to types and quantities of work according to his ability to perform such work continuously without undue impairment, without injury to himself or his fellow workmen, and with profit to himself and his employer.

2. To procure and maintain fitness for work through efforts applied to the worker as an individual.

3. To educate the worker to a comprehension of the value and significance of physical and mental well-being and, in particular, of personal hygiene and accident prevention.

4. To reduce all loss of time, absenteeism and short work spans in industry the cause of which may be related in any way to health.

This concept indicates that much of industrial medicine may be beyond the field of the average practitioner and makes apparent the fact that industrial medicine is, to a large extent, the practice of medical supervision, preventive medicine and public health within the confines of industry.

Industrial health as a field of special medical interest is relatively young. It origin, early difficulties and subsequent development are well within the memory of many physicians today. Relatively few physicians gave serious attention to safe and healthful practice in industry 30 years ago. Few physicians realized the preventive character of most occupational disorders. The rapid development of industry which gave rise to constantly multiplying hazards was followed by a lag in the development of measures, both preventive and curative, to cope with this situation. The perfection of methods of treatment and of technics of prevention by physicians, hygienists and engineering specialists in this field has been followed also by a lag in their articulation with the rank and file of practicing physicians who care for the great mass of industrial workers. The lag which has occurred is due to two factors; one is the extremely rapid development of industry in this country and the other is the failure of medical educators to give proper emphasis to the training of students, both undergraduate and graduate, and to assign to preventive medicine the place which its importance justifies. The implications of the development of industry and the change in the practice of medicine effected by workmen's compensation laws have not been sufficiently emphasized.

From "Education in Industrial Health," by DR. STANLEY J. SEEGER, Chairman A.M.A. Council on Industrial Health, in "The Student Section," *J.A.M.A.*, March 21, 1942.

American Association of Industrial Physicians and Surgeons

Twenty-Seventh Annual Meeting—Cincinnati, Ohio, April 13-17, 1942

TO THE MEMBERS OF THE ASSOCIATION:

PROJECTED against a background of war, a new kind of mechanized warfare in which the industrial physician is a veritable field marshal in the strife, the annual meeting at Cincinnati becomes clearly the most important in the twenty-seven year history of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS. The industrial physician, surgeon, hygienist and nurse emerge in a vital new role, and are winning new recognition.

IN TURN we must assume the urgent new responsibilities which accompany recognition and trust. This challenge to our professional abilities demands our utmost efforts. And how can we better fortify ourselves than by taking advantage of the post-graduate institute of instruction which has been arranged for us at Cincinnati? Fittingly, the program for this critical year is one of the most comprehensive in our history. The caliber of the specialists who will participate affords us an opportunity for invaluable information and personal contacts. To say that we must attend this meeting is an understatement. Not only must we attend, but also we must utilize this opportunity to the fullest. Cincinnati is a challenge. I will look forward with keen pleasure to seeing you there.

T. LYLE HAZLETT, M.D., President.

Program

Monday, April 13, 1942

MEDICAL CLINIC—Cincinnati General Hospital, by Staff of Department of Medicine—

1. "Hypertensive Vascular Disease in Relation to Industry"—ARTHUR FREEDMAN, M.D.
2. "Cardiovascular Syphilis in the Active Period of Life"—J. H. KOTTE, M.D.
3. "Polyneuritis—Toxic, Infectious, or Nutritional?"—MILTON ROSENBAUM, M.D.

DERMATOLOGICAL CLINIC—Cincinnati General Hospital, by LEON GOLDMAN, M.D., and Staff, Department of Dermatology. Demonstration and Discussion of Types of Industrial Dermatoses.

SURGICAL CLINIC—Cincinnati General Hospital, Staff, Department of Surgery—

1. "Management of Head Injuries, Including Fractures of the Skull" (30 minutes)—JOSEPH EVANS, M.D.
2. "Treatment of Fractures:
   (a) About the ankle.
   (b) Supracondylar fractures, the humerus.
   (c) Compound fractures.
   (d) Selected title" (50 minutes).
—JOHN A. CALDWELL, M.D., and Associates.
3. "Primary Cleansing, Compression, and Rest"—VINTON E. SILER, M.D.
4. "The Bacteriologic Study of Wounds and Burns"—W. A. ALTEMEIER, M.D.
5. "Use of Whole Blood and Plasma" (30 minutes)—PAUL HOXWORTH, M.D.

Tuesday, April 14, 1942

ADDRESS of Welcome—S. E. DORST, M.D., Dean College of Medicine, University of Cincinnati.

Address of Welcome—JOHN J. SKAVLEM, M.D., President, Academy of Medicine of Cincinnati.

Response—T. LYLE HAZLETT, M.D., President, A.A.I.P.&S.

Response—DONALD CUMMINGS, President, A.I.H.A.

ANNUAL MEETING—American Association, Industrial Physicians & Surgeons:

Opening Remarks—T. LYLE HAZLETT, M.D., President, A.A.I.P.&S.

"The Health of the Executive"—HAROLD C. HABEIN, M.D., Rochester, Minnesota.

"Cardiovascular Survey of Supervisors"—WILLIAM LEIGH COOK, M.D., Pittsburgh.

"Discussion of Papers by DR. HABEIN and DR. COOK"—Led by JOHNSON McGUIRE, M.D., Cincinnati, and A. J. LANZA, M.D., New York.

"The Preplacement Examination and Its Significance"—G. H. GEHRMANN, M.D., Wilmington, Delaware.

"The Periodic Health Examination and Important Findings Among Garment Workers"—LEO PRICE, M.D., New York.

PANEL CONFERENCE—"The Administration of Health Problems"—EDWARD C. HOLMBLAD, M.D., Presiding; C. H. WATSON, M.D.; J. J. WITTMER, M.D.; H. A. VONACHEN, M.D.; F. A. BARLOW, M.D.; F. W. SLOBE, M.D.; W. A. SAWYER, M.D.; E. E. EVANS, M.D.; E. A. IRWIN, M.D.; G. C. HARROLD, Ph.D.

"Prevention of Ill Health in Industry Using Toxic Chemicals"—JOHN FOULGER, M.D., Wilmington, Delaware.

PANEL CONFERENCE—"The Treatment of Burns"—GROVER C. PENBERTHY, M.D., Detroit, Presiding; VINTON SILER, M.D., Cincinnati, Collaborator.

"Advances in Skin Grafting"—JAMES BARRETT BROWN, M.D., St. Louis.

Discussion (with Motion Pictures)—EARL C. PADGETT, M.D., Kansas City, Kansas.

PANEL CONFERENCE—"The Treatment of the Wound in Compound Fracture"—CLAY RAY MURRAY, M.D., New York, Presiding; RALPH G. CAROTHERS, M.D., Cincinnati, Collaborator; J. ALBERT KEY, M.D., St. Louis; Collaborator; R. ARNOLD GRISWOLD, M.D., Louisville, Collaborator.

SYMPOSIUM—"Medical Service for the Small Plant."

1. "The Problem of Medical Service for the Small Plant"—C. D. SELBY, M.D.
2. "The Need from the Viewpoint of Industry"—WILL L. McGRATH, Cincinnati.
3. "Some Occupational Hazards of Small Plants"—PROF. DONALD E. CUMMINGS.
4. "Practical Methods for Providing Adequate Medical Facilities and Service"—ALFRED H. WHITTAKER, M.D., Detroit, Michigan.

Discussion led by VICTOR HEISER, M.D., New York City.

Wednesday, April 15, 1942

SYMPOSIUM ON LEAD POISONING:

PART I—Medical and Engineering Methods and Results:

"Measurement of Industrial Lead Exposure by Air Analyses"—JOHN BUXELL, St. Louis.

"Measurement of Industrial Lead Exposure by Determination of Stippling of the Erythrocytes"—LESTER W. SANDERS, M.D., Cincinnati.

"Measurement of Industrial Lead Exposure by Analyses of Blood and Excreta of Workmen"—JACOB CHOLAK, Cincinnati.

"Lead Poisoning in Industry as a Clinical Syndrome"—WILLIAM F. ASHE, M.D., Cincinnati.

PART II—General Surveys and Experimental Studies:

"A Study of the Health of Workers Exposed to Lead in the Manufacture of Storage Batteries"—W. C. DREESEN, M.D., Washington, D. C.

"Experimental Studies on Lead Absorption and Excretion in Human Subjects, and Their Relation to the Diagnosis and Treatment of Lead Poisoning"—A Summary and an Interpretation, ROBERT A. KEHOE, M.D., Cincinnati. General Discussion.

ANNUAL MEETING—American Industrial Hygiene Association:

"The Prevention and Control of Hazards in the Radium Dial Painting Industry—L. F. CURTISS, Ph.D., Washington, D. C.

"The Ventilation Requirements for Radium Dial Painting"—W. C. L. HEMEON, Boston; R. D. EVANS, BOSTON.

"High-Altitude Flying"—J. W. HEIM, Dayton, Ohio.

Wednesday Evening, April 15, 1942

ANNUAL DINNER—7:30.

Presentation of WILLIAM S. KNUDSEN AWARD.

Address—"Medical Service in Wartime"—REAR ADMIRAL ROSS T. McINTIRE, Surgeon-General, U. S. Navy, Washington.

Thursday, April 16, 1942

THE Metabolism of Nitroparaffins"—E. W. SCOTT, Cincinnati.

"The Absorption, Retention, and Excretion of Fluorides at Normal and Abnormal Levels of Intake"—WILLARD MACHLE, M.D., and E. J. LARGENT, Cincinnati.

"Vitamins and Solvent-Vapor Poisoning"—R. W. McKEE, Boston.

"Significance of Chemical Examination in Diagnosis of Silicosis"—L. U. GARDNER, M.D., and A. J. REDLIN, Saranac Lake.

"Ventilation and Dust Problems Associated with Deep Tunnel Operations in Colorado" (Moving Picture and Talk)—R. J. OWENS, Denver.

"The Casting of Magnesium"—C. R. WILLIAMS, Boston.

"Physiological Action of Metallic Magnesium"—S. F. MEEK, M.D., Detroit.

"Splinter Wounds from Light Metals"—R. Z. SCHULZ, M.D., Boston; C. W. WALTER, M.D., Boston.

"The Toxicity of Aluminum"—F. F. HEYROTH, M.D., and J. CHOLAK, Cincinnati.

"The Analysis of Atmospheric Samples of Explosive Chemicals"—F. H. GOLDMAN, Washington, D. C.

Friday, April 17, 1942

SOME Recent Observations in Phosphorus Toxicity"—R. B. L. FLEMING, and J. W. MILLER, Washington, D. C.

"The Clinical Effects of Industrial Exposure to Tellurium Fumes"—H. H. STEINBERG, M.D., Chicago.

"The Toxicity of Lead Chromate"—G. C. HARROLD, Detroit.

"Health Hazards in Steel Mills"—J. W. FEHNEL, New York.

"A Reliable Procedure for the Evaluation of Exposure to Lead by Spot Urine Sampling"—L. F. PEKRUL, Denver; R. C. LEWIS, Denver; D. E. CUMMINGS, Denver.

"The Determination of Fine Oxide Fumes in Air"—W. G. FREDRICK, Ph.D., Detroit.

Exhibits

A. S. Aloe Co.

BOOTHS 29, 30 and 31—A. S. Aloe Company will, for the fifth successive year, show a cross section of its complete line of equipment for the industrial medical department. Included are Steeline Equipment, the sensational Aloe Magnalite, a new completely self-contained dressing cart. Available also will be actual lists of equipment specified by Sinclair Refining, Atlas Powder, Hercules Powder, Bendix Products, Ingersoll-Rand, Tampa Shipbuilding, Westinghouse Electric, and other leading

plants. The Laboratory Division will display modern apparatus for general serological and clinical diagnosis, as well as several items of interest to the industrial hygienist. New spectrophotometers employed for the determination of lead in blood and urine; apparatus for the analysis of industrial poisons, etc., will also be shown and demonstrated.

Becton, Dickinson & Company

BOOTH 13—On display, hypodermic syringes and needles, all cotton elastic bandages, lastex elastic bandages and elastic adhesive bandages, diagnostic instruments, clinical thermometers and Ace Adherent for use under adhesive tape. Representatives and attendants will be fully qualified to answer questions on the care and use of any of the above items and will be happy to show how to get the most from B-D products.

The Burdick Corporation

BOOTH 4 — The Burdick Corporation will exhibit its line of Physical Therapy Equipment. Items of special interest to the industrial physician will be featured.

Cameron Heartometer Co.

BOOTH 1 — Showing the improved Heartometer, a scientific precision instrument for accurately measuring and recording systolic and diastolic blood pressures. It also furnishes a permanent graphic record of the pulse rate, the nervous functioning of the heart, and the myocardial activity as well as the functioning of the valves, clearly revealing heart disturbances in both early and advanced stages, and of great value in watching the progress of medication and treatment.

S. H. Camp and Company

BOOTH 46A—Will show a series of anatomical drawings by Tom Jones as the central theme of their display. The company's authorized dealers are equipped to serve patients for the various supports prescribed by physicians and the complete line of merchandise for sacroiliac, visceroptosis, hernial, lumbosacral, dorsolumbar, prenatal, postnatal and other specific conditions will be shown. Experts from the Camp staff will be in attendance to answer specific questions.

Carbisulphoil Company
— BOOTH 19 —

Duke Laboratories, Inc.

BOOTH 22 — Will demonstrate the original American-made stretchible, adhesive-surfaced bandage, Elastoplast, and its adaptations, Mediplast and Elastoplast Occlusive Dressings, products now being used routinely in most of the large industrial houses on war work, and in many of the governmental units, in the treatment of minor injuries. Tecto is used to combat industrial dermatitis. Nivea and Basis Soap are suggested for the care of the surgeon's hands.

E & J Manufacturing Company

BOOTH 27 — The E & J Manufacturing Company cordially invites the members of the Association to visit Booth 27 where the latest Portable Model E & J Resuscitator Inhalator and Aspirator will be on exhibit. A large number of the prominent industrial organizations are using E & J Resuscitators for the treatment of critical asphyxia. It is of particular value in those cases of asphyxia which have reached the final phase or are complicated by internal injuries, severe burns or fractured ribs.

J. H. Emerson Company

BOOTH 21 — The Emerson Resuscitator, Inhalator and Aspirator, for cases of gas poisoning, electric and traumatic shock, submersion, anesthetic accident and other asphyxia, is proving more and more valuable to industrial hospitals and first-aid stations. It not only administers automatic, pressure-control breathing, without the necessity of manual method, but also aspirates froth or mucus and administers oxygen therapy. Its effectiveness in traumatic shock makes it additional insurance against war emergencies. Oxygen and hand-operated models, especially adapted to utilities and mines, will be shown. Other Emerson equipment includes oxygen humidifiers, vascular boots and respirators.

General Electric X-Ray Corporation

BOOTH 45 — Included among the modern electro-medical apparatus which General Electric X-Ray Corporation will display will be the famous G-E Duplex Photoroentgen Unit, complete with G-E Model CRT rotating-anode x-ray tube. Already in wide use by the U. S. Army, and hailed by leading medical men as one of the most diagnostically satisfactory, economical means of conducting mass surveys of the chest, the Duplex Photoroentgen Unit provides a rapid, efficient method for making stereoscopic 4 x 5 chest films. To expedite diagnosis and interpretation these films are viewed in a special orthostereoscopic viewer. Because of their application to industrial personnel examination, these units will be of great interest to everyone attending the meeting.

Hanovia Chemical & Mfg. Company

BOOTH 2 — Physiotherapy equipment in industrial clinics is coming more to the fore each day, and your visit to this exhibit will afford the opportunity to demonstrate and explain the wide field of application of the Hanovia self-lighting ultra-violet quartz lamps, Sollux Radiant Heat Lamps and Short and Ultra Short-Wave Diathermy apparatus.

Ille Electric Corporation

BOOTH 47 — Will demonstrate the famous Ille Underwater Therapy Tank with Hydro-Massage, used in the treatment of industrial injuries, the Thermostatic Bed Tent and Paraffin Bath.

The Kelley-Koett Mfg. Co., Inc.

BOOTHS 17 and 18 — One of the most important X-Ray advances of many years, the Multicron Control, will be demonstrated. The Multicron is incorporated in the Keleket W-3-100 Combination Unit and is designed to take care of troublesome details automatically, leaving the doctor free to concentrate on the important factors of technique. It also assures work of uniformly high quality. The W-3-100 is a complete Combination Unit with Generator, Tube Stand and Table. It permits radiography and fluoroscopy at all angles from Trendelenberg to vertical. It is equipped with Bucky Diaphragm, motor tilt table, stereoscopic shift, etc.

Keystone View Company

BOOTH 12 — The Keystone Industrial Visual Safety Service is used to determine if employees and applicants for positions are visually fitted for work for which they are hired. In case they fail to attain a satisfactory rating, they are referred to an ophthalmologist for attention.

The Liebel-Flarsheim Co.

BOOTH 10 — The line of L-F Short and Ultra-Short Wave Generators in use today in the medical dispensaries of many of the largest corporations in America. The use of Short-Wave Therapy as an adjunct to regular treatment methods has definitely proved a means of saving man-hours. The famous Bovie Electrosurgical Unit for major or minor work will also be on display. All physicians are cordially invited to ask for demonstrations of this modern equipment.

The Wm. S. Merrell Company

BOOTH 26 — Will feature a practical, inexpensive approach to industry's No. 1 health problem—the common cold. Available clinical reports show effectiveness of oral vaccination with Oravax in reducing incidence and severity of colds among industrial workers and other groups. Oravax is painless, convenient, low in cost. . . . ideal for group vaccination. Now is the time to begin planning protection for employees during next winter, as vaccination should be commenced during late summer or early fall. Ask Merrell booth attendants for clinical statistics and a cost estimate for the group under your care.

Mine Safety Appliances Company

BOOTHS 15 and 16 — Features the following in its display: Instruments for the detection of toxic and combustible gases, such as Carbon Monoxide Detector, Indicator, and Alarm; Explosimeter; Benzol Indicator; Combustible Gas Alarm; Hydrogen Sulphide Detector and Hydrocyanic Acid Gas Detector; and Dust Sampling and Counting Equipment, including the Midge Impinger; Electrostatic Dust and Fume Sampler, and Dust-Counting Microscope. Also on display are personal respiratory protective equipment for all kinds of gases, dusts, and fumes; H-H Inhalator, Artificial Respiration Trainer; Foille, the new burn treatment; First Aid Materials; Ear Defenders; Goggles; Protective Hats and Caps, and Salt Tablets and Dispensers. Representatives in attendance will gladly discuss safety problems brought to their attention.

Philip Morris & Co., Ltd., Inc.

BOOTH 25 — Will demonstrate the method by which it was found that Philip Morris cigarettes, in which diethylene glycol is used as the hygroscopic agent, are less irritating than other cigarettes. Their representative will be happy to discuss researches on this subject, and problems on the physiological effects of smoking.

National Live Stock & Meat Board

BOOTH 47A — You are invited to visit the display portraying the importance of meat as a source of the B vitamins. Wax models of a normal diet featuring the thriftier meat cuts will also be shown. Register for new 24-page book, "Better Nutrition for the Nation," and other literature, including Food Value Charts.

Nutrition Research Laboratories

BOOTHS 32 and 33—This exhibit shows by means of x-rays, transparent photographs, wax models and scientific literature, the important types of chronic arthritis and the re-

IS YOUR BUSINESS BLIND?

Keystone Industrial Visual Safety (IVS) Tests screen out those who are visually fit from those who should be referred to an Eye Specialist.

•

You are invited to visit Booth 12 to take the test and to ask for details

•

KEYSTONE VIEW COMPANY
Meadville, Pennsylvania

Industrial Hygienists
and
Laboratory Directors

See the Complete Display of our Laboratory Division. Investigate our Service to You. Booths 29, 30, 31, Cincinnati, April 13.

Laboratory Division
A. S. ALOE COMPANY
1831 Olive St. St. Louis, Mo.

sponse of these to Ertron. The therapeutic advantages of Bezon, a whole natural vitamin B complex, are also depicted.

G. H. Packwood Mfg. Co.

BOOTH 9 — A safety industrial skin cleanser is one that (1) has a pH below 10; (2) contains no free alkali; and (3) has alkaline salts (less than 8% calculated as sodium carbonate) properly buffered and balanced against pH. Paxsavalened Pax Heavy Duty and Pax Hyspeed definitely are safety granulated skin cleansers for both men and women industrial plant workers. Other Pax skin cleansers, formulated to special specifications or to meet specific conditions, are also safe and superior products in their price field. Field surveys and sales records indicate that daily, as has been the case since 1926, more workers—now millions of them—wash their hands with safe Pax than any other granulated or powdered industrial skin-washing cleanser or formula.

Parke, Davis & Company
— BOOTH 46 —

Pelton & Crane Co.

BOOTH 5 — Exhibiting sterilizers and operating lights specially designed for use in the industrial clinic and first-aid room. Featured is the popular "Tri-Plex" Combination, with double storage cabinet, recessed instrument sterilizer with foot-lift, and self-contained, noiseless autoclave.

Picker X-Ray Corporation

BOOTH 48 — Visitors to the Picker X-Ray booth will have an opportunity to see the well-known Picker-Waite "Century." This diagnostic unit provides for radiography and fluoroscopy in all positions from the vertical to the Trendelenburg—either hand or motor operated. Also on display will be a fine example of a combination portable and mobile shockproof x-ray unit. This apparatus is suitable for general office use or portable work in the patient's home. A number of newly developed x-ray accessories and diagnostic opaque chemicals will be exhibited.

Powers X-Ray Service

BOOTH 11 — The Powers Rapid X-ray Method is displayed by means of pictures and comparison studies of radiograms made on Powers paper film with those on standard cellulose base film. The Rapid Paper X-ray Service makes available to industry a fast, low cost means of chest x-raying employee groups. No investment in equipment is necessary. The Powers Service is complete, from setting up the unit at the plant and taking the x-rays, to processing and returning them with a viewing box for interpretation. Authorities agree full size 14 x 17 inch paper radiographs are of high diagnostic quality and more than satisfactory for chest x-ray surveys.

J. R. Siebrandt Mfg. Co.

BOOTH 20 — A new bone instrument, the Goodwin Bone Clamp, simplifies the technique for open reduction of long bone fractures. It is made with two separate jaws to enable the surgeon to use the lower jaw as a gouge, to reduce trauma. With this clamp, the bone fragments are easily aligned. The universal Drill Guide and calibrated lock-stem control direction and depth of drilling, indicate the diameter of bone, and calculate the correct length of screw to use for applying bone plates. When wiring fractures, the entire operation, from drilling holes through fragments, to the tightening of the wires, is all done with this instrument, and a few simple accessories. See the demonstration.

E. R. Squibb & Sons

BOOTH 3—A number of new and interesting Vitamin, Glandular, Biological and Chemotherapeutic specialties will be featured in the Squibb exhibit. Representatives will be on hand to welcome you and to furnish any information desired on the products displayed.

West Disinfecting Company

BOOTH 7 — Exhibiting products for the prevention of occupational skin diseases including Lan-O-Kleen, West Protective Creams, West Sulpho Hand Cleaner, West Protective Lotion, etc. Each of these products is specifically designed against irritants, and the exhibit presents the many advantages which can be obtained through their use.

Westinghouse X-Ray
— BOOTHS 40 and 41 —

White Laboratories, Inc.

BOOTH 6 — Within recent years tremendous advances in vitamin research have added a wealth of clinical data to our knowledge of nutrition. The intense popular interest in the vitamins—often, unfortunately, confused and misled by unauthoritative lay advertising and uninformed "information"—can be properly controlled by the physician's interpretation of the actual usefulness of the vitamins to his patients. White Laboratories, Inc., presents its complete line of ethically-promoted vitamin preparations. Representatives are in attendance to discuss the use of White's products in vitamin prophylaxis and therapy; descriptive literature is available for review.

The Max Wocher & Son Co.
— BOOTH 8 —

John Wyeth & Brother, Inc.
—BOOTH 24 —

F. E. Young & Co.

BOOTH 23 — Manufacturers of Dr. Young's Rectal Dilators. The dilator set consists of a series of four bakelite dilators, graduated in size and introduced in series as the rectum becomes accustomed to dilation. Rectal dilation is used by physicians to treat certain cases of constipation, rectal neurosis, uncomfortable bowel movement, and other conditions which may arise due to a tight or spastic sphincter muscle.

New Committee

DR. T. LYLE HAZLETT, President of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS, announces the formation of that Association's Committee on the Common Cold. Under the chairmanship of DR. A. G. KAMMER, Medical Director, Inland Steel, the members include DR. MARK W. GARRY, Montreal Mining Co., Montreal, Wisconsin; DR. CHARLES E. SHANNON, Medical Director, Marshall Field Store, Chicago; DR. J. S. CHALMERS, Sand Springs, Oklahoma; DR. HOWARD J. LAFFERTY, Sharon, Pennsylvania; and DR. MICHAEL J. LEPORE, Chief, Nutrition Clinic, Columbia University Medical Center, New York. The committee will study the preventive aspects of the subject and from time to time submit reports to the president of the association. Industrial physicians and surgeons who are investigating one method or the other of cold prophylaxis and who do not intend to publish reports of their studies are invited to submit their data for study and correlation by the committee. All such data will thus be added to the recorded experience, and sound opinion on the subject is to be hoped for in the not too distant future. Full credit to the contributing physicians will be made in all published reports of the committee. Address DR. A. G. KAMMER, 3210 Watling Street, East Chicago, Indiana.

Western Association

THE program of the Second Annual Meeting of the WESTERN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS (A.A.I.P. & S. component) which will be held at Del Monte, California, Sunday, May 3, 1942, is as follows:

"Diagnosis of the Source of Hematuria Following Severe Accidents"—DR. J. J. CRANE, Los Angeles.

"Geographic Distribution of Industrial Medical Problems in California"—DR. HAROLD T. CASTBERG, U. S. Public Health Service, Berkeley, California.

"Industrial Nursing"—DR. W. P. SHEPARD, Metropolitan Life Insurance Co., San Francisco.

President's Address—DR. ROBERT T. LEGGE.

"Industrial Medicine in the Aviation Plant"—DR. FENN E. POOLE, Lockheed Aircraft, Glendale, California.

"The Division of Industrial Hygiene of the Los Angeles County Health Department"—MR. FRANK STEAD, Sanitary Engineer, Chief, Division of Industrial Hygiene.

"Workmen's Compensation"—MR. WARREN PILLSBURY, Deputy Commissioner, U. S. Employees' Compensation Commission, San Francisco.

"Industrial Medicine's Responsibility During and After the War"—DR. R. T. JOHNSTONE, Los Angeles.

"The Work of the Council on Industrial Health of the A.M.A."—DR. CARL PETERSON, Secretary, Council on Industrial Health, A.M.A., Chicago.

IT HAS been recognized during the past year in England and Canada, and is now being called to our attention in the United States, that there is a possibility of impairing our efficiency by too many hours of work without adequate relaxation. In the training of athletes, boxers, musicians and others, for individualistic efforts, there is reached a point or condition of over-training called "going stale." This simply means reduced efficiency by over-work or over-training.

Right now the way many medical departments and physicians are being over-worked long hours per day and seven days a week, this danger of "staleness" becomes a real threat to our efficiency. Change of activity, a short trip, an opportunity to escape from it all for even a day or two is what most of us need. Why not take a day, or even a few days, to attend the coming joint Annual Meeting of the AMERICAN ASSOCIATION OF INDUSTRIAL PHYSICIANS AND SURGEONS and the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION at Cincinnati, April 13 to 17? There you will meet your friends and will have opportunities to exchange ideas and discuss your problems; and there will be other forms of relaxation. Wise managements will insist on sending their medical directors and plant physicians to this outstanding meeting on Industrial Medicine and Surgery.

Hope to see you, therefore, in Cincinnati.

EDWARD C. HOLMBLAD, M.D., Managing Director

Industrial Medicine
Reg. U. S. Pat. Off.

The Journal of Traumatic Surgery and Occupational Diseases

Established 1932, by A. D. CLOUD

Executive, Editorial, and Publication Offices:
540 No. Michigan Ave., Chicago.

Editor-in-Chief: C. O. SAPPINGTON, M.D., DR. P.H.

Editors:
O. A. BRENENSTUHL, M.D.
JAMES T. CASE, M.D., F.A.C.S
VOLNEY S. CHENEY, M.D., F.A.C.S.
BRADLEY L. COLEY, M.D., F.A.C.S.
HART E. FISHER, M.D., F.A.C.S.
OTTO P. GEIER, M.D.
EMERY R. HAYHURST, M.D.
WILLIS W. LASHER, M.D., F.A.C.S.
ROBERT T. LEGGE, M.D., F.A.C.S.
CHRISTOPHER LEGGO, M.D.
OSCAR L. LEVIN, M.D.
WM. D. MCNALLY, M.D.
M. N. NEWQUIST, M.D.
FREDERICK W. SLOBE, M.D., F.A.C.S.

Managing Editor: A. D. CLOUD.
Advertising and Business Manager: STEPHEN G. HALOS.

Volume 11 **APRIL, 1942** **Number 4**

Credit!

MORE than eight years ago we said in these pages that we were then beginning a series of biographical sketches which would probably say things about well-known industrial physicians and surgeons which they would never say about themselves and would be reluctant to have anyone else say about them; that, notwithstanding, we believed these things should be said; that the most interesting subject in any field is the men who made it; that in the industrial medical field the intensely human relation between doctor and patient should not begin and end in the patient's troubles so far as human interest is concerned, since the doctor as a man is fully as interesting to others as his own patient is to him; and that, from our point of view, the physician's modesty was not an important objection to such compliments as the facts supported where he, himself, was an interesting human being. All of this was true then, and is true now. And it is even more significant now, because the rather recent recognition of industrial medicine too easily leaves to inference and implication the recognition of the men who made industrial medicine. Those men are an important and an interesting group. Each has his own personal part in the history of industrial medicine, peculiar to his abilities, expressive of his talents, and individually essential in the aggregate result. If we appraise them and their respective roles in the remarkable developments of the last 25 years, we are only giving credit where credit is due. And if, concerning any one, the appraisal praises, who that knows him shall doubt that he deserves it, and who that doesn't shall begrudge. This is apropos of the sketch on page 170. As to the subject we cherish the thought that the coincidence of the meeting in April in his home town is, on the face of the record, entitled to be called a fortuity of tribute.

Convention

THE A.A.I.P.& S. meeting at Cincinnati this month brings together the country's industrial physicians and surgeons under circumstances tremendously different from those of their meetings during that other war. This is said elsewhere in these pages, but it deserves emphasis and repetition. The difference is the record of a quarter-century of scientific progress. Those who remember the other meetings will appreciate it; those who have come in since will profit by it.

Cooperation

MUCH is being said these days about cooperation between the industrial physician and the general practitioner. Most of this, however, is being suggested as coming from the industrial physician; he is being urged to make his desire to cooperate manifest — in short, to be the aggressor, as it were, responsible for the first move. This is entirely satisfactory to him, but it should not be permitted, from the need to do it and the habit of its being done, to evolve a situation where the cooperation is all in one direction. Regardless of what the general practitioner may have thought about industrial medicine prior to the comparatively recent upsurge of interest in it, the spirit of active and responsive cooperation on his part will put him in a position to get quite as much as he gives. For example, medical departments in increasing numbers throughout the country, and in vastly more locations than ever before, are installing the latest and best in laboratory and medical equipment. Indeed, many of them are as well outfitted from every standpoint as the average hospital — a good many, much better. These facilities can be availed of by the general practitioner in the locality, and his use of them will help him to solve many a problem which otherwise might be beyond the reach of his own laboratory or testing, or even x-ray, facilities, or those conveniently accessible to him.

Interpretation of the Patch Test

OVER 40 years ago Jadassohn presented the principle of the patch test and applied it to industrial medicine in Germany with wide experimentation, but in the United States and other countries the study has been confined to the last 15 years. Since Markley reported its use in December, 1928, there have been many papers in American medical literature which have definite references to patch testing. The evaluation of the importance of this aid to diagnosis is demanded with accurate differential diagnoses in the establishment of claims. More and more articles appear discussing both the technique and relative importance of these tests.

It is now common knowledge that hypersensitivity may be further tested by renewed contact with the suspected agent, and that such tests applied to the skin of the worker, are known as patch tests. All studies of contact irritants today include sections devoted to the results of these tests as applied to the sufferers

Urine-Sugar Analysis in One Minute

CLINITEST

New Convenient TABLET *Method*

Reduced to a few words, the new CLINITEST Tablet method of testing for urine-sugar is as simple as this:

Just drop a CLINITEST Tablet into a small amount of previously diluted urine, allow a few seconds for reaction and examine for color.

No equipment for boiling is needed—tablets *generate own heat.*

CLINITEST is reliable—the Color Scale retains the familiar progression of colors used in the qualitative Benedict's test, indicating the following amounts of sugar: 0%, ¼%, ½%, ¾%, 1% and 2% plus.

Complete CLINITEST Urine-Sugar Analysis Set (with tablets for 50 tests)—costs the patient only $1.25. Tablet refill (for 75 tests)—$1.25.

Write for full descriptive literature.

Available through your prescription pharmacy

EFFERVESCENT PRODUCTS, Inc.
Elkhart, Indiana

under discussion. In purely epidermal sensitization, as in occupational dermatitis, the allergen gives a positive reaction when applied to the skin of a susceptible worker, while intracutaneous tests prove to be negative. Clinically, the seat of the original aggravation might have been either the dermis or epidermis, since one cannot be damaged primarily without secondarily affecting the other.

The physician who applies the test can place no faith in the results if he is not carefully trained in the technique. He must learn the proper concentration of the chemical to be used, recognizing in advance just how strong a concentrate may be employed on the normal skin, and for what length of time it can remain there without causing injury or burn possibilities. Numerous lists of correct strengths for testing purposes are available for a large number of common substances, which, when placed on the unbroken skin of a normal individual for 24 hours, cause no reaction to take place. Other lists of the proper proportions of substances to be used in patch testing, together with the appropriate dilutions of most test substances irritating the skin in its normal condition, are also accessible. When these thresholds of irritability are known, the substances or the dilutions used in the tests themselves should, therefore, be made weaker than that point.

It has been shown that different parts of the body of the same person, differ greatly in degrees of sensitivity, so that the selection of the part of the body to be tested is very nearly as important as the substances to be used in the test. Areas of the skin approaching as nearly as possible to the original site of the inflammation, are usually the best places on which to perform the tests. However, it must be recognized that this section of the body might possibly have been further sensitized by the presence of the neighboring dermatitis itself.

The worker, who alone of all his fellows is suffering from a dermatitis, should be patched with the materials used in the course of his occupation. If he is patched with only one substance, then a control patch should be placed upon him. If he is patched with more than one substance, then any negative reaction from one of these substances will serve as a control. When testing solids, the perspiration of the patient obtained from the axilla should moisten the substance. In order to perform more exact patch tests, it will be necessary to have further studies performed by research workers on the chemical contents of perspiration under different conditions, because it has been noted that the sweat of an individual may vary from an alkaline to an acid reaction, and under the present hit or miss system, we have no idea as to what type perspiration the patient was forming at the time of the original irritation. Sometimes it is necessary before obtaining a reaction, to try several different perspirations of varying hydrogen in content.

In addition to the use of dilutions proven to be harmless to the normal skin, the insulating material inserted between the chemical and the adhesive plaster which affixes it, should be a non-irritating substance which could not possibly assist in the reaction. Sawdust, certain rubber compounds, as well as waterproofed cellophane have characteristics which of themselves are capable of causing irritations. Un-

varnished cellulose or a thin sheet of mica have been proved most innocuous.

The appraising of the patch test is the most difficult part, since it can only be considered as a corroborative link in the chain of evidence, and must be read with a full knowledge of the particular occupation involved, the history of the dermatitis, and the site and morphology of the lesion. The correct etiology can only be arrived at by these all-inclusive considerations.

Should the patch test give a positive reaction, that merely means that the portion of the skin patched was sensitive to the contact agent at the time of testing. Before we can come to any conclusions that the substance tested was the one responsible for the occupational dermatitis, we must be positive that the patient was exposed to the material in the course of his work in approximately the same strength which has been employed in the test. We must also presuppose that the patient's skin was also sensitive and predisposed to irritation at the time of the occupational exposure, and that his general physical condition was such as to play a contributory role to the founding of his allergy. We must also know that the substance used for testing purposes is not a primary irritant.

When, however, the patch test is positive, and the differential diagnosis also points to a contact dermatitis, and the physical conditions of the occupation involved account for the presence of the substance used in the test, it seems reasonable to quote the findings of the patch test as one part of the entire diagnosis.

If the results of the test are negative, it is equally inaccurate to conclude that the agent tested had nothing to do with the causation of the dermatitis, since the area tested might not have been sensitive to the contact agent, while the area of the eruption might well have been. On the other hand, should it be possible to perform the test at the exact site of the eruption after the latter has been cleared of the inflammation, there is the possibility that the skin of that area has been immunized by the diseased condition itself. A negative test might also result from the impossibility of reproducing the exact conditions of the original irritation since there are several external conditions almost impossible to repeat, such as climatic, frictional, etc., even if the physician has succeeded in testing with the correct concentration which in itself is a great problem.

In the last analysis, should the tests remain negative, the possibility occurs that the correct substance has not been located with which to test the worker's sensitivity, and having exhausted the chemicals used during occupation, it is wise to test those found at the home of the worker, particularly anything new with which he has made recent contact.

It must be remembered that the reaction to patch testing is not always an immediate one; the time element may vary from a few hours to a few days. While some dermatologists believe that the delayed reaction is due to the fact that the skin was sensitized directly by the patch put upon it, we hold that it merely denotes hypersensitivity. As a further precaution to check on the accuracy of positive tests, enough substances should be tested to discover whether the worker has developed a polyvalent sensitivity, and if this proves to be the case, the patch test loses its diagnostic value.

—OSCAR L. LEVIN

HEAT-FAG and ACCIDENTS Ride Together

BEWARE of Heat-Fag . . . that dangerous, insidious force that saps the vitality of workers — brings on fatigue — and in many cases is the direct cause of accidents. Man-hour protection *must* precede production. When men sweat, they lose body salt. As the natural salt balance in the system is disturbed, there is a definite lowering of efficiency. The worker tires — becomes inalert — careless. A slight mistake and—another costly accident is chalked up. Heat-Fag again takes its toll.

AVOID HEAT-FAG··USE MORTON'S SALT TABLETS

QUICK DISSOLVING (less than 30 seconds) This is how a Morton Salt Tablet looks when magnified. Examine one—see how soft and porous it is inside. When swallowed whole — with a drink of water, they dissolve in less than 30 seconds.

Wherever workers sweat, Salt Tablets are needed, for they represent the simple, easy way to replace salt that's lost through sweating and hot work.

Case of 9000 10-grain salt tablets **$2.60**

Salt-Dextrose Tablets, case of 9000 **$3.15**

Order from your distributor — or directly from this advertisement.

Place MORTON'S DISPENSERS at all Drinking Fountains

• • •

They deliver salt tablets, one at a time, quickly, cleanly—without waste. Sanitary, easily filled, durable. 500-tablet size, $3.25. 1000-tablet size $4.00

MORTON SALT CO., Chicago, Ill.

FREE Sample Tube Write—on your firm letterhead — for a pocket size sample tube of Morton's Salt Tablets and for the new folder — "Heat-Fag and Accidents Ride Together."

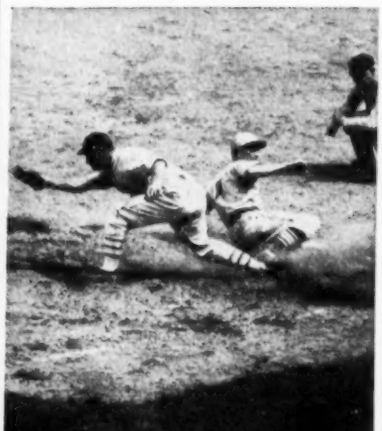
EVERYONE WHO SWEATS NEEDS SALT

DOCTOR: *May we send you the facts on* **VitaMight?**

A proven Vitamin-Mineral diet supplement now being used by scores of prominent industrial physicians to maintain full nutrition among all classes of employees. • Recommended Dosage, One Vitamin and One Mineral Capsule Daily. Costs average less than 14c Per Week Per Employee. • Sold only for industrial use as prescribed by the industrial physician. An ethical Vitamin-Mineral preparaton, never sold or advertised to the public. Write for free booklet. "Production Insurance For Industry," which every industrial physician should have.

VITAL FOODS CORPORATION
TRIBUNE TOWER, CHICAGO

SAFE!



—and ALKALOL is safe too

Safe to use on the tender membrane of the eye — and therefore safe to use on any mucous membrane or irritated tissue. Soothing—Agreeable.

●

THE ALKALOL COMPANY
TAUNTON, MASS.
Write for free sample
·ALKALOL·
ALKALINE·SALINE·CLEANSING

INDUSTRIAL HEALTH AND DISEASE

Physical Examinations in Industry

E. V. GOLTZ, M.D.,
Medical Director, Northwestern Bell Telephone Company, Minnesota Area, Saint Paul, Minnesota

PRE-EMPLOYMENT as well as periodic re-examinations are compulsory as affecting certain industries in many states of the union through properly organized Boards of Industrial Hygiene which usually function hand in hand with the workman's compensation act.

These examinations have for years been well organized and under state jurisdiction in the Carolinas and most of the seaboard states, because of occupational silicosis-asbestosis and other forms of pneumoconiosis; and all workers in these hazardous occupations are registered and compensated by their various states. Wisconsin is showing much activity in this direction; and our own state of Minnesota has a Division of Industrial Hygiene which has been making a survey for nearly a year, its purpose being the classification and control of occupational diseases.

So far as I know, there are no such diseases charged against the operating end of the telephone business. Therefore, with us, this work is entirely voluntary, and its purpose is largely liaison between management and employee in the proper placement of workers on the basis of the mental and physical ability of the individual as well as the safety of fellow workmen in all departments, especially in the construction and maintenance of both outside and inside equipment. To quote an editorial in *J.A.M.A.*:

"One of the foremost objectives of Industrial Medicine is to fit every person to types and quantities of work according to his ability to perform such work continually without undue impairment, without injury to himself or to his fellow workman, and with profit to himself and his employer."

Pre-employment examinations in industry are only the primary steps in the individual's industrial health program and do not mean a requirement of 100% supermen and women. In over 20 years of this work my own total rejections have been less than 3%, while placements have been many times that; and a few were employed for rehabilitation after the last war.

Our own plan of examinations and placements for men is also that of the parent company, the American Telephone & Telegraph Company. It was carefully worked out by a council of medical directors and is similar to the physical examination procedure outlined by the Conference Board of Physicians in Industry. All men are stripped, and the examination is similar to that of the army. Partial examination may be made in some cases, and others may need special care.

New employees are graded A-B-C-D.

Class A.—Recommended for immediate employment in any position. Example: No physical impairment. Correction of carious teeth advised within six months.

Class B.—Recommended for employment in specific positions only. Example: Simple mitral heart disease; loss of vision, one eye—other eye normal; limited use of muscles of arm or leg; inguinal hernia controlled by truss. Persons employed in Class B should not be transferred without securing on opinion from the medical department.

Class C.—Recommended for employment after physical impairments have been corrected and then classed A or B. Example: Extensive caries of teeth; acute discharging ear; enlarged thyroid with symptoms; inguinal hernia without support.

Class D.—Not recommended for employment in any capacity. Example: Advanced tuberculosis; chronic trachoma; acute primary syphilis; true diabetes.

Great tact and kindliness must be exercised in dealing with all defectives in order not to discourage them. In all the above cases, there is considerable allowable leeway, for example: Under or overweight of 20%; moderate impairment of vision and

In *Minnesota Medicine*, November, 1941.

FIRST-AID
★ ★ ★ By Physical Therapy ★ ★ ★

Your factory clinic can render efficient FIRST AID by installing modern Short Wave Diathermy, Ultra Violet and Low Voltage equipment. LEPEL offers you this complete equipment. Keep your experienced employees "on the job" and thus maintain PEAK PRODUCTION by treating them with this MODERN equipment in the FACTORY CLINIC.

Showing treatment of leg by Short Wave Therapy.

Distributors and Service in all Large Cities
Write for details

LEPEL HIGH FREQUENCY LABORATORIES, INC.
39 West 60th Street
NEW YORK, N. Y.

PLY

PROTECTS THE MEN
BEHIND THE MEN
BEHIND THE GUNS!

PLY protective creams and liquids—proved in industry for more than a decade—provide positive prevention against industrial dermatitis . . . skin disorders caused by contacts with acids, alkali, explosives, solvents and other materials essential to industry. Only PLY offers a specific formula for each individual group of hazards. Investigate PLY TODAY!

● Without obligation, write for authoritative, illustrated booklet *The Answer to Industrial Dermatitis.* Every man responsible for production should have the newest edition of this practical guide.

PIONEERS OF SKIN PROTECTION IN INDUSTRY
PLY
The MILBURN Co.
901 HENRY STREET • DETROIT, MICHIGAN

hearing; blood pressure variation, etc. All results and recommendations are forwarded to the employment department and are often discussed with them personally.

Blood Wassermann tests are usually routine; and I feel that industry will soon be doing routine Mantoux tests as well, with chest x-ray of the positive reactors. Widals and stool examinations if indicated are routine with food handlers. Periodic re-examinations, including chest x-rays, are compulsory in many occupational disease districts and are reported periodically to the State Hygiene Boards. Industry in general, however, has found it valuable to combine this with accident prevention training by the safety engineering department.

An ever-alert, health conscious management, however, is the best safeguard in industry and should supervise periodic examinations where they are not compulsory. With us, men over 50 years of age who are climbing poles should naturally be closely observed by the management and examined often.

All employees should be at liberty to ask for an examination and advice from the medical department through their department heads. If diagnosis is possible, or if further study and treatment is necessary, the individual should then be referred to the family physician along with a letter or telephone call giving all information possible and including any laboratory data obtained. In this way it is possible for the medical department to cooperate with the worker's physician; and every effort should be made to develop and maintain cordial relations with him.

The industrial physician should not treat any employee who needs home medical treatment. First aid emergency care only should be furnished. For field accidents each crew should have "first aid" training and should carry "first aid" kits for this purpose. After the emergency care the family physician, the neighborhood doctor, or the hospital should be used, depending on the gravity of the case.

Every effort should be made by the medical department in cooperation with the family physician to place the injured worker upon his return in some form of disability assignment. The greatest harmony and economy can thus be obtained for the benefit of all concerned.

In industry, as in other walks of life, cardiovascular and renal diseases are increasing and demand careful placement and checking. Often a little less work with a two-hour rest period at noon will keep these people on the job for many years. Definite periodic examinations should be made, and real interest shown in the individual to accomplish this.

The ever-present tuberculosis group gives the industrial physician his greatest opportunity in those districts having no occupational diseases. Many with arrested diseases are employed and re-employed, and there must of necessity be a clear-cut program of adequate periodic re-examinations in all of these cases with the complete cooperation of the individual and management with the medical department. Industry must assume its share of arrested tuberculosis cases existing in its community.

It is of interest to report the results obtained in checking several groups of tuberculosis exposures in some of our larger offices here in Saint Paul, Minneapolis, and Omaha. Out of a total of about 200 Mantoux tests, over 60% were positive in all ages, while over 75% were found in those over 35 years of age. This is in considerable contrast to the results obtained in the school age group and in rural districts. In a small group of 22 employees just examined, 14 were positive; and of these, 10 had normal lungs, while four had demonstrable healed lesions, an incidence of nearly 30% of arrested tuberculosis. Obviously, these cases need periodic re-examinations.

In conclusion, it is my opinion that the full time industrial physician of the future should have specialized training for this work, which requires acquaintance with management policy, public relations, employee relations, industrial commissions, industrial hygiene boards, etc.; and medical schools are already recognizing and meeting this need.

The Future of Industrial Health in Factories

H. M. VERNON, M.A., M.D.

THE question of factory workers' health came into special prominence in 1915, when the excessive hours of work exacted from munition workers, and the conditions under which their work was sometimes carried on, caused so much sickness that the government found it necessary to appoint a "Health of Munition Workers Committee." This committee was empowered to consider and advise on questions of industrial fatigue, hours of labor and other matters affecting the health and efficiency of munition workers, and though its investigations had some permanent influence in improving industrial conditions, they were to a large extent disregarded after the war was over, in spite of the fact that the Industrial Fatigue Research Board was set up in 1918 in order that their work might be continued and extended. A certain number of large firms introduced their own medical services but Dr. Donald Stewart states[1] that the number of whole-time industrial doctors was probably not more than about 20 in 1927 and 60 in 1939. In July 1940, however, Mr. Bevin, as Minister of Labour, made a Factories (Medical and Welfare Services) Order compelling occupiers of factories engaged on armament work to appoint whole-time or part-time medical practitioners, nurses and welfare supervisory officers, if requested to do so by a senior inspector of factories. In consequence of this order, and of the appointment by the Ministry of Supply of medical officers to supervise the workers in factories where their health was liable to be affected by exposure to dangerous substances, there are now over 150 whole-time industrial medical officers and probably over 500 part-time officers employed in Great Britain. In addition, many more industrial nurses have been appointed.

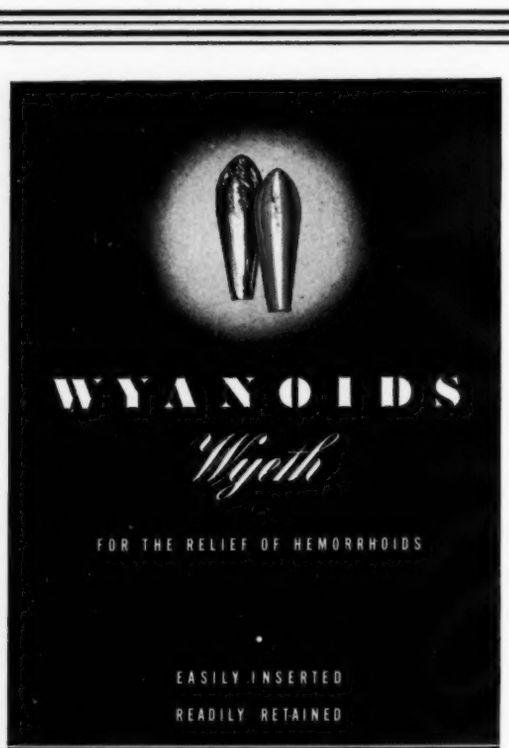
From *Labour Management* (London), February, 1942.

Duties of Medical Officers in Factories

AS IS pointed out in a leading article,[1] the majority of the newly-appointed doctors have had but little training in the industrial side of their work, and it is necessary for them to discover their special duties and opportunities for themselves. They have been to some extent assisted by sporadic week-end training courses at Birmingham, Manchester and Sheffield universities, but it is more especially in relation to the wider problems of accidents and sickness among the workers, and to the need for linking up industrial medicine with the social requirements of the community, that they need help. Fortunately these aspects of their work are now becoming more generally recognized, for the British Medical Association published a memorandum on the duties of Industrial Medical Officers in 1937, and it subsequently appointed a representative committee to inquire into the subject of "Industrial Health in Factories." The detailed report of this committee has just been published,[2] and it is likely to be of great value in stimulating attention to the subject.

In many respects the health of industrial workers is already looked after under the provisions of the National Health Insurance scheme, and by various hospital services and government health services, so it is necessary for us to dwell only on the gaps in these services which are, or should be, the special province of industrial medical officers. They may conveniently be discussed under a number of headings, some of which relate more particularly to medical questions, and others to the environmental conditions in the factory.

EXAMINATIONS OF ENTRANTS INTO INDUSTRY. Under the Factory Act all juveniles under the age of 16 have to be examined by an examining surgeon and certified to be fit for the particular employment on which they are engaged or are going to be engaged. Hitherto the examination has usually been rather superficial, and it is to be hoped that in the future it will be made a more thorough one, and that



Effective, Convenient and Economical

THE effectiveness of Mercurochrome has been demonstrated by twenty years' extensive clinical use.

For the convenience of physicians Mercurochrome is supplied in four forms—Aqueous Solution for the treatment of wounds, Surgical Solution for preoperative skin disinfection, Tablets and Powder from which solutions of any desired concentration may readily be prepared.

Mercurochrome, H.W.&D.
(dibrom-oxymercuri-fluorescein-sodium)
is economical because solutions may be dispensed at low cost. Stock solutions keep indefinitely.

ACCEPTED AMERICAN MEDICAL ASSN

Mercurochrome is accepted by the Council on Pharmacy and Chemistry of the American Medical Association.

Literature furnished on request

HYNSON, WESTCOTT & DUNNING, INC.
BALTIMORE, MARYLAND

the surgeon will advise the management concerning the suitability of the entrant for hard physical labor, in general, for light work, or sedentary work. New employees over 16 years of age cannot legally be compelled to undergo a medical examination, but it is to be hoped that in course of time all employees will be examined, not only on entry, but at regular intervals during the period of their employment. A careful medical examination is specially important for those workers who have been absent because of sickness or accident, in order that they may be assigned to work suited to their capacity. A strong man may need a period of light work before he is capable of undertaking heavy tasks or, if physically handicapped as the result of an accident, he may have to be permanently relegated to light work.

MEDICAL INDUSTRIAL PSYCHOLOGY. The medical officer should collaborate in the vocational guidance and selection of the new employees. In a large factory such guidance and selection should be assigned to a special psychological department, and the few factories in this country which have set up such a department have found that it much more than repays its cost, owing to the higher efficiency of the selected candidates and the great diminution in the number of misfits, who may have been given weeks of expensive training for which they prove to be unfitted. For reasons of health the medical officer desires that employees should be as well suited as possible to their tasks, in order that they may not fall sick from psychoneuroses. Several large scale investigations have shown that from a third to a sixth of all the causes of sickness experienced by industrial workers are due to psychological disorders such as anxiety states, and the frequency of the nervous breakdowns is largely influenced by occupational conditions. In order to estimate the extent of sickness from various causes, psychological and otherwise, all firms should keep careful sickness records of their employees. These records should be under the charge of a medical officer.

SICKNESS ABSENCE. The Report of the B.M.A. Committee laid great stress on the importance of records of sickness. They maintained that they are the basis of all industrial health research, and they considered that the keeping of such records should be compulsory. The effects of medical supervision, coupled with a study of sickness absence, may be gauged by the fact that firms which have adopted it have been able to reduce the sickness of their employees to a half or a third the national average of sickness, whilst sepsis cases have sometimes been reduced to a fifteenth of their number. Again, a study of sickness records may lead to the discovery of important occupational hazards which have hitherto escaped notice. A case in point is that of mule spinner's cancer.

ACCIDENTS. The medical officer should be responsible not only for the treatment of cases of accident by himself or by the nurses under his charge, but also for giving advice to the management on their prevention. The mechanical side of accident prevention is not his province, but the human factor, with which he is so largely concerned, is far more important than the mechanical factor in accident causation. A systematic examination of accident statistics may throw considerable light on some aspects of industrial health and efficiency. For instance, it may show that certain persons are specially liable to incur accidents, or are accident-prone, and in consequence ought not to be kept at risky occupations. Again, in everyone accident liability is likely to be influenced by many or all of the conditions of factory environment which are mentioned in the next section. Accidents such as fractures ought, if possible, to be sent to an organized fracture clinic. Treatment at such institutions reduces the average period of disability by a half or quarter, and almost entirely prevents permanent disability. Subsequent treatment at a rehabilitation centre may remove the stiffness which impedes return to full industrial work.

THE WORKING ENVIRONMENT. The B.M.A. Report suggests that the medical officer ought to spend a definite proportion of his time in the work-

THE INJURED BACK AND ITS TREATMENT

by

JOHN D. ELLIS, M.D.

Senior Surgeon, St. Luke's Hospital
Chicago, Illinois

With these CONTRIBUTING AUTHORS: H. Earle Conwell, M.D., Birmingham; Loyal Davis, M.D., Chicago; Nathan S. Davis, III, M.D., Chicago; Ralph K. Ghormley, M.D., Rochester; Hale A. Haven, M.D., Seattle; Professor Sir Arthur Keith, F.R.C.S., F.R.S., London; Robert B. Osgood, M.D., Boston.

"A useful addition to the library of all who treat painful backs." *Surgery*

"Recommended for every practitioner." *The Military Surgeon*

"Excellent." *The American Journal of the Medical Sciences*

"The best treatise on spinal injuries yet published." *New England Journal of Medicine*

"A comprehensive description of great value." *Journal of Bone and Joint Surgery*

"It is a 'must' number for the medical library." *Surgery, Gynecology and Obstetrics*

VIII, 377 pages 156 figures 1241 index references $5.50

Published by **CHARLES C. THOMAS**

Springfield, Illinois, U.S.A.

shops, especially in his early days, in order that he may become familiar with the processes and the work done in various parts of the factory, and with the conditions under which it is carried on. He ought to note if the standards of ventilation, heating and lighting are adequate, and to see that the workers are suitably clothed and seated, having regard to the particular tasks on which they are engaged. He should ascertain that the hours of work are not excessive, even in periods of high pressure such as are experienced in war-time, for the fatigue thereby induced is a potent cause of sickness and accidents. He should find out whether any of the employees are subject to exceptional industrial hazards, such as the presence of harmful gases and dusts in the air inhaled, or of deleterious substances in the materials manipulated, especially those likely to cause industrial dermatitis. He should also ascertain that the works canteen provides hot meals at reasonable prices, for it is well recognized that the health of the workers is very largely dependent on their nutritional state.

Industrial Health Research

IT WILL be realized that the elaborate range of duties outlined offers innumerable opportunities for research into scientific problems relating to industrial health. Industrial research has been rather neglected in the past, and therefore offers specially great opportunities to the keen medical officer. Much valuable research has been done during the last 20 years by the Industrial Health (formerly Fatigue) Research Board, but its work has been curtailed by inadequate resources. Also the Medical Inspectors of the Factory Department have done important research work on specific industrial hazards; but, as the B.M.A. Committee points out, they have the greatest difficulty in obtaining the necessary time and expenses to conduct investigations. In the light of these and other difficulties, the committee recommends that "machinery, preferably on a national scale, should be devised to place industrial health research on an efficient basis."

1. *British Med. J.*, November 29, 1941.
2. Industrial Medicine in Britain. *Indust. Med.*, March, 1942.

References on Industrial Hygiene
—*In Relation to National Defense*—

Compiled in National Health Library, 1790 Broadway, New York City

ABELL, IRVIN. The physician in industry and national defense. Industrial medicine (Chicago) 10: 275-77, July 1941.

ADLER-HERZMARK, JENNY. Lighting, ventilation and safety in factories during blackout. Industrial medicine (Chicago) 11: 76-78, February 1942.

AMERICAN medical association. Council on foods and nutrition. Indiscriminate administration of vitamins to workers in industry. Journal of the American medical association (Chicago) 118: 618-21, February 21, 1942.

BRISTOL, L. D. Health and defense. National safety news (Chicago) 43: 10-11, 58-60, May 1941.
Relates to health of industrial workers.

BRISTOL, L. D. Industrial health and national defense. Journal of the American medical association (Chicago) 115: 1235-37, October 12, 1940.
Also in Industrial medicine (Chicago) 10: 217-20, May 1941.

BROWN, E. W. Industrial hygiene and the Navy in national defense. War medicine (Chicago) 1: 3-14, January 1941.
Abstracted in U. S. naval medical bulletin (Washington, D. C.) 39: 321-25, April 1941.

BROWN, E. W. The role of the nurse in naval defense industry. Industrial medicine (Chicago) 11: 94-97, February 1942.

CLARKE, WALTER. Syphilis, gonorrhea, and national defense industries. Journal of social hygiene (New York City) 27: 169-74, April 1941.

DALLAVALLE, J. M. Defense work of industrial hygiene engineering unit. Industrial bulletin, New York state department of labor (Albany) 20: 227, August 1941.
Work in New York state.

DIVISION of industrial hygiene defense activities; priorities in volatile solvents. Industrial bulletin, New York state department of labor (Albany) 21: 33, January 1942.
Studies made by New York state division on safe solvents.

DRAPER, W. F. Protecting industry from venereal diseases. Journal of social hygiene (New York City) 27: 98-102, March 1941.
Gives some figures for Army.

ELIASBERG, WLADIMIR. National defense work and the human factor. Medical record (New York City) 153: 414-15, June 4, 1941.

FLINN, R. H. The industrial health program in Maryland. Maryland state department of health, Monthly bulletin (Baltimore) 13: 30-35, June 1941.

FULTON, W. B. Industrial health and Pennsylvania's defense industries. Pennsylvania's health, State department of health (Harrisburg) 2: 16-20, May 1941.

FULTON, W. B. National defense and occupational disease. Industrial medicine (Chicago) 10: 398-400, September 1941.

GREENMAN, R. H. Health for industrial trainees. Survey midmonthly (New York City) 77: 236-37, August 1941.
Program in Rochester, N. Y. to care for those attending vocational classes for war industries.

HARDIMAN, WINIFRED. Role of industrial nurse in the national defense program. Connecticut health bulletin, State department of health (Hartford) 56: 14-17, January 1942.

INDUSTRIAL hygiene in aircraft plants. Weekly bulletin, California state department of public health (Sacramento) 20: 203, January 10, 1942.
Surveys made in ten government establishments for health hazards.

INDUSTRIAL hygiene in defense: September developments. Industrial bulletin, New York state department of labor (Albany) 20: 302-3, October 1941.
Accomplishments of the New York state industrial hygiene division.

IVY, A. C. The physiology of work. Journal of the American medical association (Chicago) 118: 569-73, February 21, 1942.
A discussion of mental and physical fitness as necessary for industrial production.

KUH, CLIFFORD. Physical examinations in industry. Proceedings of the Life extension examiners (New York City) 2: 109-12, September-October 1940.
Some of the problems connected with preemployment examinations especially at this time of industrial mobilization for preparedness.

LA GUARDIA, F. H. An address. Journal of social hygiene (New York City) 27: 321-26, October 1941.
Delivered May 21, 1941 on protection of defense workers and soldiers from commercialized vice.

LEGGE, R. T. Industrial medicine in national defense. Industrial medicine (Chicago) 10: 282-84, July 1941.

MAYERS, M. R. Industrial hygiene defense program, the rubber industry. Industrial bulletin, New York state department of labor (Albany) 20: 166, June 1941.

MCCONNELL, W. J. Mobilization of industrial hygiene for national defense. American journal of public health (New York City) 32: 9-14, January 1942.

MEDICAL care of workers in defense industries. Medical care, Committee on research in medical economics (New York City) 1: 78-83, Winter issue, 1941.
Editorial.

NATIONAL defense work brings new hazards to the worker's health. Industrial bulletin, New York state department of labor (Albany) 19: 231-32, December 1940.
Program of the New York state Division of industrial hygiene, to eliminate health hazards.

NEAL, P. A., JR. Industrial health and the national defense. Industrial medicine (Chicago) 9: 629-31, December 1940.

PARADOXY. Industrial medicine (Chicago) 10: 161, April 1941.
Editorial on interdependence of work and health in war industries.

PETERSON, C. M. The relation of the problems of industrial medicine to medical preparedness. Rocky Mountain medical journal (Denver) 38: 856-59, November 1941.

PROTECTION of soldiers, sailors, and workers from syphilis and gonorrhea. Journal of social hygiene (New York City) 27: 181-90, April 1941.
I. From the standpoint of the public health officer, by M. C. Hanson.—II. The citizen's part, by Roger Deakin.

RICHARDSON, M. A. We prepare for disaster at Bridgeport hospital, Bridgeport, Connecticut. American journal of nursing (New York City) 41: 902-3, August 1941.
Plans of a hospital in an industrial center.

ROBINSON, M. V. Saving the women, too. Trained nurse and hospital review (New York City) 107: 340-45, November 1941.
Need for protecting the health of those in the second line of defense.

RUSSELL, A. E. Syphilis in industry as a defense measure. Pennsylvania's health, State department of health (Harrisburg) 2: 21-26, June 1941.

RUSSELL, J. P. Industrial hygiene and the national defense program. Weekly bulletin, California state department of public health (Sacramento) 19: 149-51, October 1940.

RUSSELL, J. P. and INGRAM, F. P. Occupational health hazards in aircraft production. War medicine (Chicago) 1: 811-15, November 1941.

SAFEGUARDING workers in defense industries. Public health nursing (New York City) 33: 191, March 1941.
U.S.P.H.S. designated as a national defense agency.

SCOTT, R. M. The industrial nurse's place in the mobilization program. Monthly bulletin, Indiana state board of health (Indianapolis) 44: 4, 16-17, January 1941.

SEEGER, S. J. The role of industrial medicine in medical preparedness. Journal of the American medical association (Chicago) 117: 182-84, July 19, 1941.

SELBY, C. D. Industrial health marches on: chairman's address. Journal of the American medical association (Chicago) 117: 159-61, July 19, 1941.

SELBY, C. D. Industrial hygiene problems in the national defense program. Industrial medicine (Chicago) 10: 118-20, March 1941.

SELBY, C. D. New medical opportunities in national defense industries. New York state journal of medicine (New York City) 41: 2023-26, October 15, 1941.

SPOLYAR, L. W. Industrial hygiene and the national defense. Monthly bulletin, Indiana state board of health (Indianapolis) 44: 5, 17-18, January 1941.

TOWNSEND, J. G. Protection of workers in civilian defense industries. Industrial medicine (Chicago) 11: 12-14, January 1942.
Venereal disease control in industry is a public health problem.

VINTINNER, F. J. Industrial hygiene and the national defense program. New Hampshire health news, State board of health (Concord) 18: 5-7, December 1940.

VONDERLEHR, R. A. The control of the venereal diseases among national defense workers. Journal of social hygiene (New York City) 27: 175-80, April 1941.

WILZBACH, C. A. Syphilis, the worker, and national defense. Journal of social hygiene (New York City) 27: 436-38, December 1941.
Results of testing industrial workers in Cincinnati, Ohio.

INDUSTRIAL HYGIENE SECTION

This Industrial Hygiene Section is published to promote sound thought upon and concerning industrial hygiene. To that end it will contain articles, discussions, news items, reports, digests, and other presentations, together with editorial comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited.

Industrial Medicine

Reg. U. S. Pat. Off.

The Editorial Committee will exercise its best judgment in selecting for publication the material which presents most exactly the factors affecting industrial health and developments for control of potentially injurious exposures. The editors may not concur in opinions expressed by the authors but will endeavor to assure authenticity of fact.

The Science, the Law and the Economics of Industrial Health

Volume 3 | April, 1942 | Section 2

Contents

WAR and INDUSTRIAL HEALTH CONTROL 184
By *Donald E. Cummings*

LEAD EXPOSURES in the Printing Industry in Virginia..... 185
By *R. T. Homewood* and *H. J. Worsham*

PORTABLE FIELD COLORIMETER for Industrial Hygiene Use 187
By *T. R. Thomas* and *Leslie Silverman*

IMMERSION METHOD for the Rapid Approximation of Quartz in Industrial Dust 189
By *W. B. Wardlow*

DERMATITIS CONTROL in A Mass Production Industry..... 190
By *Thomas F. Mooney*

OCCUPATIONAL DISEASE HAZARD Evaluation in the Field 192
By *Warren A. Cook*

LOCAL SECTION NEWS 197

OFFICIAL PUBLICATION of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, DONALD E. CUMMINGS, Denver, Colorado, *President;* PHILIP DRINKER, Boston, Massachusetts, *President-Elect;* GORDON C. HARROLD, Detroit, Michigan, *Secretary;* THEODORE HATCH, Philadelphia, Pennsylvania, *Treasurer.*

Published in January, April, July, and October of each year as the Industrial Hygiene Section of INDUSTRIAL MEDICINE.

Editor: WARREN A. COOK

Editorial Committee:

H. H. SCHRENK, *Chairman*
C. W. MUEHLBERGER
A. D. BRANDT
W. R. BRADLEY
L. J. GOLDWATER, M.D.
MANFRED BOWDITCH
R. A. KEHOE, M.D.

Editorial Offices:
540 North Michigan Ave., Chicago, Illinois.

Managing Editor:
A. D. CLOUD, Managing Editor, INDUSTRIAL MEDICINE

American Industrial Hygiene Association
Third Annual Meeting
Cincinnati, Ohio, April 13-17, 1942.
(Complete Program on Page 174)

Program Committee:

PHILIP DRINKER, *Chairman*
H. H. SCHRENK
W. J. MCCONNELL, M.D.
WARREN A. COOK

War and Industrial Health Control

HOPE for victory in the conflict which has engulfed us appears justifiable only if our industries ultimately surpass those of the enemy in producing materials essential to modern warfare. Industry's assignment is obvious, but the best plan of attack is in doubt. The prospect of a short war appears dismal, and prudence warns us to prepare for a protracted struggle. A temporary reckless spurt in effort accomplished at the cost of permanent impairment to the efficiency of both workers and machines would be a stupid blunder if it reduced the final sustained rate of war production. However, unless reasonable precaution is observed soon, our industry, straining at the prodigious task of increasing output, or converting production to war materials, faces the fate of the athlete who in his enthusiasm overtrains.

During this critical period, the man power of industry in particular confronts many formidable obstacles. Workers to replace those entering the armed forces will be recruited largely from classes considered unfit for military service, and unless selected and placed with nice discrimination will increase tremendously the risks to which all groups of employees are exposed. New and unfamiliar materials or processes will introduce additional hazards. Increased production will tend to evolve greater concentrations of toxic or noxious substances in the working environment. These factors, coupled with the inevitable necessity of extending the hours of employment, especially among skilled and semi-skilled individuals, will threaten the continued effectiveness of vital industrial establishments. As experience demonstrated the wisdom of placing athletes under the management of competent trainers during periods of preparation for grueling contests, so it should be apparent that essential industrial workers now need experienced health supervision more than ever before.

The U. S. Public Health Service, the U. S. Navy, and the U. S. Army, recognizing the value of applying adequate health control procedures within their jurisdictions, have created or expanded industrial hygiene divisions during recent months. High commendation is due these official agencies for their foresight but their accomplishments should not obscure our vision of the fact that little has been done to promote im-

proved health service within many essential industries, or even to insure the continuation of existing facilities.

The control of health in industry requires the application of a relatively new science, the techniques of which generally are employed most skillfully by specially trained younger members of the interested professions, or by older individuals whose experience actually has qualified them in the field of disease and accident prevention. Can it be considered wise to divert competently trained industrial physicians, hygienists, chemists, or nurses from indispensable positions in industry to types of military service which do not fully utilize these practically irreplaceable skills? The War Production Board would do well to give this problem immediate consideration.

—DONALD E. CUMMINGS.

Lead Exposures in the Printing Industry in Virginia

R. T. HOMEWOOD, *Engineer*,
H. J. WORSHAM, *Chemist*,
Bureau of Industrial Hygiene,
Virginia State Department of Health

THE concentration of lead in the atmosphere has been determined in 16 job printing and nine daily newspaper plants. These determinations were made to evaluate the potential lead hazard and to obtain data as a basis for recommendations where needed control was indicated. Specimens of urine were obtained from operators of processes shown to create high atmospheric concentrations. The results of analyses on these urine samples were used to augment the atmospheric samples as a further indication to plant officials of need for control.

Sampling and Analytical Procedures

AIR samples for lead determination were collected with an M.S.A. electrostatic precipitator. The precipitator tubes were kept in specially designed Pyrex bottles[1] until they were to be used, and returned to the bottles immediately after the sample was collected. The precipitator tubes were treated with warm 5% nitric acid in these Pyrex bottles to take the precipitated lead into solution. Urine samples were collected in lead-free Pyrex bottles furnished by our department. In order to avoid contamination from the plant atmosphere, from clothing, and from the hands, the bottles were not used in the plant and the operators were requested to change clothes, to wash their hands, or preferably to take a bath before starting to collect the specimen; therefore, samples represent about 15-hour instead of 24-hour specimens.

The quantity of lead in atmospheric samples was determined by the mixed-color dithizone method developed by Bambach[2], with modifications eliminating the step for the detection of bismuth. The urine leads were run by the method exactly as outlined by Bambach. A neutral wedge photometer was used to determine the concentration of lead in the final extraction.

Type Casting and Composition Departments

LINOTYPE: The linotype machine casts slugs by forcing molten metal at a temperature of 535° to 550° F. against matrices that have been assembled by the operator from the matrix magazine by manipulating a keyboard mechanism. The composition of the metal varies within small limits but is usually 84% lead, 11.5% antimony, and 4.5% tin. The melting pots are heated by electricity or gas and thermostatically controlled. The temperature of the melting pot is not sufficiently high to form metal fumes; so there appeared to be two potential sources of atmospheric contamination of sufficient duration to warrant investigation, namely, (a) dust from the surface of the molten lead in the pot, and (b) dust produced from the trimming wheels that trim the cast slugs to proper size. No effort was made to differentiate between these two sources. Samples were collected at 23 linotype machines at job printing plants and four machines in newspaper plants. The precipitator tube was placed at the breathing level of the operator and as close as possible without interfering with the operation of the machine.

MONOTYPE CASTERS: The casting operation of the monotype is similar to that of the linotype in that molten metal is brought in contact with a matrix but individual characters instead of line slugs are cast. A monotype does not require a keyboard operator at the machine; the machine operates automatically from a punched paper roll cut at a keyboard by another man in another part of the plant. One caster attendant, therefore, may look after as many as five casting machines. The machines are heated electrically or by gas and usually are controlled thermostatically. Monotype machines use metal that contains about 75% lead, 17% antimony, and 7% tin. The casting temperature is around 850° F. In a number of cases the caster was in a room isolated from the rest of the plant. Probably this was done because considerable heat escapes from the machine and not because they were considered to be hazardous from a lead standpoint. Samples were collected at the breathing level of the monotype attendants at 12 locations in job printing plants and two locations in newspaper plants.

COMPOSING AND PRESS DEPARTMENTS: In the composing department the slugs, type, and plates are fitted together and assembled to give the page form. The only mechanical operations incident to this work that would create a hazard from lead dust are sawing slugs and plates, brushing type, and crushing lead on the floor by walking. It was found in a number of plants, especially job plants, that the composing was

TABLE I.
ATMOSPHERIC LEAD CONCENTRATIONS IN PRINTING PLANTS
Type Casting and Composition Departments
Plants A-P, incl.,—Job Printing; Plants Q-W, incl.,—Newspapers
Milligrams per 10 Cubic Meters

Plant	Linotype	Monotype	Press and Hand Comp.	Plant	Linotype	Monotype	Press and Hand Comp.
A		1.91	0.52	K	0.00		0.00
			0.39		0.01		
B	2.03		1.05	L	0.31	0.32	0.18
C	0.55		0.18		0.32	0.16	
	0.32				0.54		
D	0.02		0.11	M	0.14		0.02
E	0.31		0.32	N	0.06	0.08	
F	0.10	0.24	0.05			0.06	
		0.14		O		0.46	0.06
G	1.80	1.81	0.00			0.00	
	2.08	0.15*	0.15			0.04	
	0.08*			P	0.03		0.01
	0.15*			Q	0.13	0.21	
H	0.17		0.14		0.05		
	0.05			R	0.20	0.93	
	0.26			S	0.29		
	0.02			V			2.65
I	0.08			W			0.416
	0.12						
	0.00						

*After improved natural ventilation.

Presented at the Annual Meeting of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, Pittsburgh, May 7, 1941.

TABLE II
ATMOSPHERIC LEAD CONCENTRATIONS IN PRINTING PLANTS
Stereotype and Remelt Departments
Plants A-P, incl.,—Job Printing; Plants Q-Y, incl.,—Newspapers
Milligrams per 10 Cubic Meters

Plant	Remelt				Stereotype		
	Pouring	Skimming	Dressing	Sieving	Casting	Skimming	Dressing
A	3.13						
G	1.39		54.00				
	6.76						
	3.14						
	0.25						
H	1.52						
K	0.01						
M	0.11						
N	0.10		3.09				
P	0.10						
Q					1.75		24.70
R	0.18		41.30		0.29	1.43	
			81.40		0.12		
S	0.32		14.68[1]		0.03		
T		2.81	293.00	111.10	0.35	2.21[3]	
				87.60 }			
				159.00 }[3]			
U		45.90	42.80[4]		1.63		
					2.05		0.88[5]
V			481.00[2]		0.35		
					0.38		
W	0.77		16.20[4]		0.41		4.02
X		5.05	152.80[6]		0.99		15.20
Y		59.80[4]	163.00[7]	955.00	0.61		72.50

[1]10-day intervals; [2]monthly; [3]with and without wet cloth over sieve; [4]semi-weekly; [5]wind blowing from sampler; [6]6-week intervals; [7]bimonthly.

done in the same room with other operations, in some cases including remelting. It is not unusual to find job printing plants operating in one room. Newspaper plants quite often perform other operations in the room with the composing tables, but in most cases the press room is isolated from the other departments. The main potential source of dust in the composing and press departments appeared to be from other operations rather than from the departments themselves. Samples were collected at the breathing level of the workers at 15 locations in job plants and at two locations in newspaper plants.

STEREOTYPE: The stereotype operation consists of pouring or pumping molten metal into an enclosed form in which has been placed a paper mat on which the lettering has been impressed. The resulting metal plate, either flat or semicircular, is used directly on the presses either with or without linotype or monotype slugs. The stereotype metal has a composition of 81% lead, 13% antimony, and 6% tin, and is kept at a temperature from 550° to 650° F. The pots are heated by coal, gas, oil, or electricity, and the temperature is controlled either thermostatically or manually.

TABLE III
URINARY LEAD CONCENTRATIONS ON WORKERS IN NEWSPAPER PLANTS
Milligrams per Liter

Plant	Workers Age	Experience Years	Lead Mg. per Liter	Exposure for Short Intervals Mg. per 10 Cu. Meters
Q	21	3	0.122	
	33	20	0.032	
R			0.117	81.4 daily
T	44	6	0.252	293.0 daily
U	53	7	0.036	45.9 daily
	51	32	0.088	42.8 semi-weekly
W		3	0.140	16.2 semi-weekly
X	35	16	0.066	0.99 daily
	26	5	0.186	152.8 at 6-week intervals and 15.2 daily
Y	62	21	0.083	72.5 daily
	49	14	0.044	955.0 bimonthly
8 Non-exposed persons in State Health Department				Max. 0.064
				Ave. 0.030
				Min. 0.001

REMELT: In the remelt operation in some of the plants, the used linotype and monotype slugs are melted, the resulting molten metal cleaned by use of a flux, the dross (oxides and dirt) removed, and the clean metal poured into pigs for re-use. In other plants flux is not used when slugs are melted, only the dirt and oxides which naturally rise to the surface are skimmed off together with sufficient metal to give a solid mass. When a quantity of these skimmings has accumulated, it is put back into the remelt pot and treated with a flux. The dross removed from the metal is stored in a drum and returned to the type metal factory for credit. The removal and subsequent handling of this dross is a dusty process creating a very high atmospheric concentration of lead. The dross is removed from the pot with a perforated almost flat ladle, which is jarred against the edge of the pot to cause as much molten metal as possible to flow through the holes and retain the oxides. Usually these oxides are then dropped (sometimes thrown) onto the floor or into the dross drum. Since the oxides are quite finely divided, they disperse into the room atmosphere and frequently remain suspended for some time. This is particularly true in plants where the dross is put through a sieve to recover a larger percentage of the metal; the sieving operation creates an excessive amount of fine dust.

Results on Atmospheric Samples

LINOTYPE, MONOTYPE, COMPOSITION AND PRESS (Table 1): Samples in only three linotype, two monotype, and one composition and press room locations showed results higher than 1.5 milligrams per 10 cubic meters. The 1.80 and 2.08 milligrams in linotype samples and the 1.81 in monotype were in the same plant. After a rearrangement of this plant to provide better ventilation, the low results, 0.08, 0.15, and 0.15 were obtained.

The value 2.65 milligrams per 10 cubic meters obtained in the composition department of Plant V was shortly after drossing was done in a connecting room. The other high values are unexplained.

From these values it is evident that there is no general lead hazard in linotype, monotype or composition and press departments.

STEREOTYPE: In the stereotype casting operation, results in two plants were slightly higher than 1.5 milligrams per 10 cubic meters, but since this job usually requires less than a half-day, it was not considered necessary to recommend more than vigilance in maintaining good natural ventilation. In the drossing of these pots, however, values as high as 72.5 milligrams per 10 cubic meters were found. The drossing operation is of short duration, so the use of lead-dust respirators was recommended.

REMELT: It was in the remelt operation that the real lead hazards were found. The pouring process is not bad, but skimming, drossing, and sieving create high exposures. In the skimming operation, as much as 59.8 milligrams per 10 cubic meters were found. In the drossing operation values as high as 481 milligrams per 10 cubic meters were found, and in sieving a value of 995 milligrams per 10 cubic meters.

In spite of the fact that in many of the plants the drossing operation is infrequent, such high exposures as are indicated should be controlled. It was recommended that all remelt operations be isolated, that the pots be fully enclosed and properly vented, that adequate general exhaust ventilation be installed in these rooms, that the operators be instructed to lay the dross rather than drop or throw it, and that the operators wear lead-dust respirators. A good type of ventilation for the pot and dross barrel is that suggested by H. W. Ruf.[3]

Results of Urinary Lead Determinations

THE 11 specimens of urine from workers exposed to high atmospheric concentrations of lead contained from 0.032 to 0.252 milligrams per liter. The average urinary lead on specimens from eight non-exposed persons in the State Health Department was 0.030. Because of inability to obtain weighted exposures of individuals, and in the absence of physical examinations, no attempt will be made to evaluate these urine data. There are apparent inconsistencies, but, as has been stated, the specimens were obtained to augment the atmospheric results as a further indication to plant officials of need for control.

Summary

IN THE evaluation of the lead hazard in the printing industry in Virginia, it was found that atmospheric concentrations of lead were generally within allowable limits in linotype, monotype, composition, and press departments. However, in drossing and sieving operations concentrations as high as 955 milligrams per 10 cubic meters were found. These operations are worse in newspaper plants than in job printing plants because of the larger amount of metal used. The urinary lead excretions of the workers engaged in these operations showed values that also indicate an unusual exposure to lead.

On the basis of these findings, recommendations have been made to plant officials for control measures to reduce these exposures.

References

1. Special glass cylinders, similar to Scientific Glass Apparatus Company (Bloomfield, New Jersey) catalog No. J-555, but made of 2.5 mm. Pyrex glass. Inside diameter 45 mm., *net* inside height 200 mm. "No-lube" joint to be 45/12 with stopper hollow but with solid bottom. (Refer to correspondence of June 15 and June 29, 1939, with Virginia State Department of Health.)

2. BAMBACK, K.: Determination of lead by dithizone. Modifications and improvements of the Hubbard-Clifford-Wickmann method as applied to biological material. *J. Ind. Eng. Chem., Anal. Ed.*, 11, 400-403, (1939).

3. RUF, H. W.: Studies on the lead hazards in certain phases of printing. I. Actual lead exposures as measured by the amount of lead in printing atmospheres. *J. Ind. Hyg. & Tox.*, 22, 445-463, (1940).

A Portable Field Colorimeter

—For Industrial Hygiene Use—

T. R. THOMAS *and* LESLIE SILVERMAN

THE application of colorimetric and nephelometric methods for industrial hygiene air analyses has increased steadily in the past few years. These methods have the advantage of high sensitivity, simplicity, and rapidity, thus expediting the work of the analyst.

It is frequently necessary to analyze a concentration on location and to be able to determine whether or not a serious condition exists. This principle is employed in physical instruments, such as the interferometer, the carbon monoxide indicator (hopcalite recorder), and the Tri-Per analyzer which was described recently.[1]

The purpose of this paper is to describe a portable instrument which will enable the operator to make certain colorimetric analyses immediately after collecting the sample. This procedure eliminates the guesswork on certain analyses where the amount existing is unknown and the volume of sample to be taken must be estimated, or a trial sample taken. If a direct color-reacting reagent can be used, then sampling can be stopped when the desired or readable color has been obtained.

From the Department of Industrial Hygiene, Harvard School of Public Health, Boston, Massachusetts.

Description

THE photoelectric colorimeter has been used for several years and many circuits have been devised.* For field use, it was felt that the circuit adopted should be as simple as possible with rapid and maximum response.

In all photo-electric circuits, a constant or known light source is necessary and also the cell characteristics must be known. Of the types of cell available, the copper oxide ("Photox") was chosen because it does not have any "drift." This phenomenon present in other types of cells does not allow immediate readings to be taken because the cell must attain an equilibrium condition.

The light source selected was a 13 (G-3.5) Mazda 3.8-volt flashlight bulb. This was mounted in its reflector and connected to four radio "C" batteries arranged in parallel. The light source was connected to a double-pole spring switch which when in normal position shunted the micro-ammeter, thus allowing the meter to be damped rapidly and moved easily without damage. This circuit is indicated in Fig. 1. Two small rheostats in parallel control the light source and are used for making the zero setting.

Light filters are of the Wratten gelatin variety. These filters were cemented in segmental sections between two glass discs, as shown in A of Fig. 4. A small brass disc was cut to separate the sections and prevent overlapping.

The filters which were selected were the green No. 58, the blue No. 47, the red No. 25, and the purple No. 35. These were found ample for the determinations desired. For straight photometric or nephelometric determinations, a clear segment was left in the filter disc. This disc is readily rotated to the desired filter position by sliding the absorber block out of its socket and turning the disc.

The light source was found to give always reproducible results if operated slightly over voltage. For determinations in which the purple filter is necessary, the drain is somewhat severe because of the density of this color. For laboratory use or for outside current sources, the unit is provided with a female 110-volt plug connection which can be used with the secondary of a constant voltage transformer or a storage battery or other source. If desired, a plug can be obtained for using with an automobile lamp outlet or battery connection.

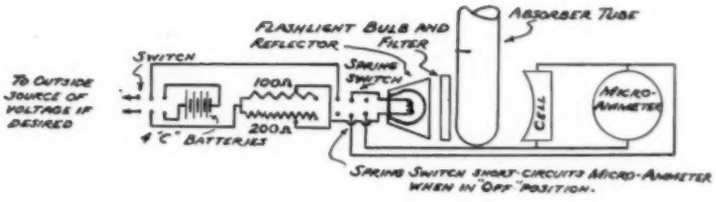
The colorimeter tubes are the lower section of the absorber and consist of pyrex tubes with ground glass connections, as shown in Fig. 3. These tubes are made as near alike optically as possible. Each of the tubes can be used with the removable absorbers. No transfer errors can occur since readings are made on the sample directly in the absorber tube.

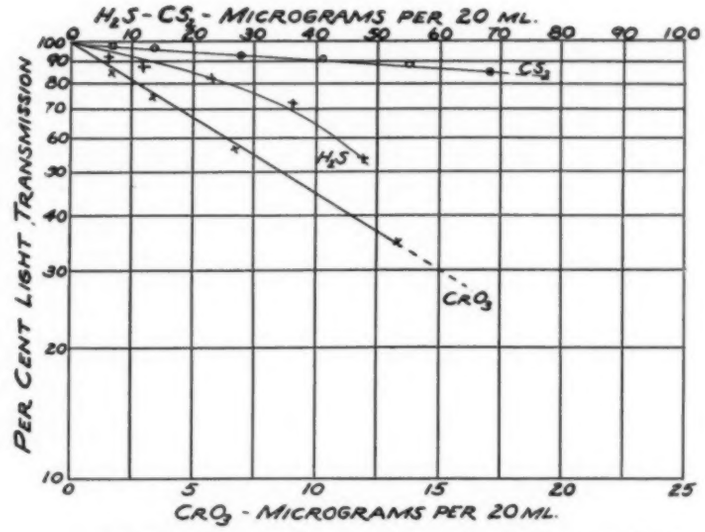
The micro-ammeter is a standard model, 301 Weston, having a 0-50 micro-ampere scale. Wilson[2] recommends the use of a 0-20 micro-ampere scale unit with any normal coil resistance because he found that there is no sensible departure from linearity with intensity of illumination over the full scale. The meter used was available in the laboratory and is fairly inexpensive and gives good results.

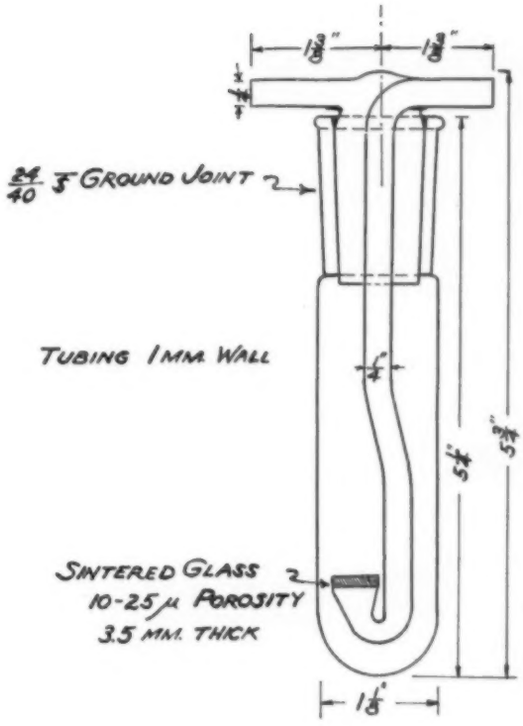
Fig. 5 shows the assembled instrument with colorimeter tubes and absorber. The apparatus was all assembled in a simple wooden case whose size is 10 in. x 7 in. x 5½ in.

The complete unit weighs 8½ pounds.

*While this work was in progress, a portable colorimeter has been described[3] using a rather complicated circuit with a photo-electric cell and sensitive amplifier. This unit was designed for hospital use and requires a few minutes for heating. It also has a meter drift due to fatigue of light source and cell.







(LEFT—Above): Fig. 1: Schematic diagram of the instrument and its circuit.
(LEFT—Below): Fig. 2: Calibrations for CS_2 (vapor), H_2S (gas), and CrO_3 (mist). H_2S was calibrated using red filter, CrO_3 using the green filter, and CS_2 was done with the green filter, although the purple gives the maximum light absorption.
(RIGHT): Fig 3: Constructional details of the micro-absorber.

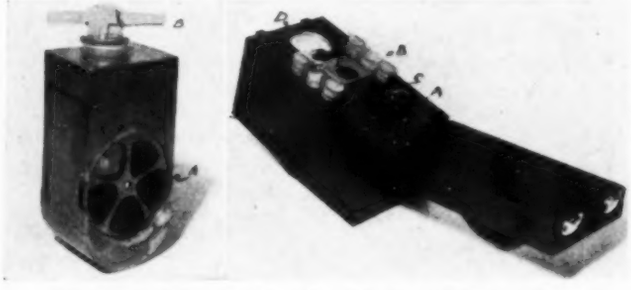
Calibration of the Instrument

THE colorimeter is calibrated in the same manner as a laboratory instrument. Standards are prepared corresponding to the range desired. The proper filter to give maximum light absorption is selected and readings are made and recorded. Readings are made by adjusting the meter scale with the light source rheostats to give full scale with the blank of reagent. Standard tubes are then inserted in the absorber block and the spring switch shifted to "on" position. The meter is then read immediately. This reading is accurate and readily reproducible, because the cell gives instantaneous response. This operation requires about 5 to 10 seconds and no fatigue of the light source is noticeable. Readings of the meter in per cent of full scale, which are the per cent of maximum transmission, are plotted against concentrations, as in Fig. 2. The green filter was used for CS_2 because the light source was not strong enough for the density of purple filter selected. In laboratory use, where an adequate power source is available, this filter is satisfactory. Since it was desired to determine CS_2 in the field, the green was chosen and is adequate if used for the field determinations.

As can be seen in Fig. 2, those reactions which obey Beer's Law give straight-line calibrations.

Use of the Instrument

THE colorimeter can be used for all types of colorimetric and nephelometric determinations. In the field, those reactions which take place directly are particularly desirable. Table I lists several reactions which can be used for field determinations. This table is by no means complete, as there are several other colorimetric tests which can be used in the field. The unit can also be used for certain straight photometric determinations, such as dust samples taken for filter testing.



(LEFT): Fig. 4: Absorber block and filter mount of the colorimeter. "A" is the rotating filter unit and "B" is the complete absorber in place. In making readings, the sintered tube is removed.
(RIGHT): Fig. 5: Complete colorimeter assembly in case.
A—Rheostats for light filament.
B—Absorbers, two complete and four additional tubes.
C—Spring switch for light and micro-ammeter control.
D—Micro-ammeter.
E—Absorber and filter unit in place.

TABLE I.
COLORIMETRIC DETERMINATIONS ADAPTED TO FIELD USE WITH PORTABLE COLORIMETER

Contaminant	Reagent	Color	Filter	Reference
Carbon dioxide	Methyl red	Red	Green	(4)
Carbon disulfide	Diethylamine and copper acetate	Yellow	Purple	(5)
Chlorine	O-tolidine	Yellow	Purple	(6)
Chromic acid	s-diphenyl carbazide	Red	Green	(4)
Hydrogen sulfide	Ammonium molybdate	Blue green	Red	(8)
Nitric oxides	Sulfanilic acid and beta-naphthylamine	Rose	Green	(9)
Trichlorethylene	Pyridine and sodium hydroxide	Orange	Green	(10)

Summary

A SIMPLE circuit portable photoelectric colorimeter containing combined absorber and colorimeter tubes is described. It is adapted to field or laboratory use for determinations by colorimetry, nephelometry, or photometry.

[ACKNOWLEDGMENT: We wish to express our thanks to DR. E. D. WILSON, of the Research Laboratories, Westinghouse Electric & Manufacturing Company, for his kindness in providing the copper-oxide cell (Photox).]

Bibliography:

1. HANSON, V. F.: Ultra-violet photometer. Quantitative measurement of small traces of solvent vapors in air. *Ind. & Eng. Chem., Anal. Ed.*, 13:119 (1941).
2. WILSON, E. D., Westinghouse Research Laboratory: Personal communication (1940).
3. MORGAN, R. H., and WEINHOUSE, S.: An inexpensive portable photo-electric colorimeter. *Am. J. Clin. Path.*, 10:114 (1940).
4. MORGAN, R. H., and WEINHOUSE, S.: An inexpensive alternating-current photo-electric colorimeter. *J. Lab. & Clin. Med.*, 26:416 (1940).
5. WENZLER, R. J., and BAUMBERGER, J. P.: A photometric method for the determination of carbon dioxide. *Ind. & Eng. Chem., Anal. Ed.*, 11:371 (1939).
6. VILES, F. J.: Field determinations of carbon disulfide in air. *J. Ind. Hyg. & Tox.*, 22:188 (1940).
7. BARRETT, H. M.: The determination of trichlorethylene in air. *Ibid*, 18:341 (1936).
8. SNELL, F. D., and SNELL, C. T.: Colorimetric methods of analysis. D. van Nostrand & Co., Inc., New York, p. 538 (1936).
9. SILVERMAN, L.: Unpublished data (1941).
10. His Majesty's Stationery Office: Nitrous fumes. Methods for the detection of toxic gases in industry. Leaflet No. 5, London, (1939).

Immersion Method

—For the Rapid Approximation of Quartz in Industrial Dusts—

W. B. WARDLOW,
Division of Industrial Hygiene,
State Department of Health,
Austin, Texas

IN MAKING studies of silica exposure it is frequently desirable to make rapid approximations of the quartz content of numerous samples of similar qualitative composition. In many cases estimation of that proportion of material falling within certain refractive index limits, as determined by immersion methods, offers a satisfactory solution. It is the purpose of this paper to describe such a procedure which we have found satisfactory as an auxiliary analytical method and for making rapid approximations where great accuracy is not essential.

Preliminary Considerations

THE use of refractive index measurements as a factor in establishing the identity of minerals has been in use for some time, and at least one proposed method for the estimation of quartz in industrial dusts depends upon the determination of the proportion of material falling between certain chosen refractive index limits.[1]

In determining the refractive index of a particle by immersion methods, it is customary to immerse it in a series of liquids of known refractive index and to note the movement of light boundary when examined under a microscope as the focus is changed, this being toward the medium of higher index as the microscope tube is raised from focus and toward the medium of lower index as the tube is lowered from focus. Merwin[2] is credited with being first to use variation of light wave length to alter refractive index, and Emmons[3,4] has devised a comprehensive system of varying both temperature and wave length to make refractive index measurements of particles with a minimum number of immersions.

Presented at the Annual Meeting of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, Pittsburgh, May 8, 1941.

TABLE I.
REFRACTION OF QUARTZ AT VARIOUS LIGHT WAVE LENGTHS
(Data from International Critical Tables)

Wave Length	Refraction (ordinary ray)
340.36	1.5675
410.	1.5565
480.	1.550
508.58	1.5482
533.85	1.546799
589.29	1.544
627.8	1.54282
656.3	1.5419
670.8	1.54147
728.1	1.540
766.5	1.539

When a single constituent of a mixture is to be identified by placing its refractive index within certain limits, it is possible to obtain both limits from a single immersion provided the liquid be properly chosen and the mineral does not have too high a dispersion. Liquids in general have a greater change in refractive index than solids, with changes in temperature and light wave length. Quartz possesses a relatively weak dispersion of visible light (Table I), and as thermal variations are slower and difficult under some conditions, it seemed desirable for us to use only light variations to alter the index of the immersion liquid.

If a particle of quartz be immersed in a liquid having a high dispersion and a refractive index for sodium light just equal to the quartz, it will be almost, if not entirely, invisible when illuminated by sodium light. If illuminated by a source emitting a continuous spectrum, the particles will appear yellow-orange in color with a surrounding blue-green halo, if the microscope tube is above focus, and blue-green in color with a yellow-orange halo if the tube is below focus. These color changes are due to the quartz having a higher refractive index than the liquid for one portion of the light and a lower index for another. If a color filter transmitting only a band of red light be interposed between the source of illumination and the microscope, the quartz will have a higher index than the liquid for the red rays, while a filter which passes only blue rays will show the quartz to have a lower index than the liquid. By employing a filter that transmits bands of red and blue, it is possible to check both values by a single manipulation.

Apparatus

IN ADDITION to the refractometer, microscope slides, cover slips, etc., usually employed, a selection of light filters is required. We have not made a critical study for the selection of the most satisfactory filters available, and those mentioned below are given merely as examples of some that we have used with satisfactory results. In general those having narrow transmission bands are desirable. The variety offered by manufacturers leaves room for the analyst's individual preference.

Immersion liquids having high dispersive power are essential. Where no temperature control is to be used it is desirable to employ a series, each member of which differs from the next by only a slight interval of refractive index (about $0.003N_D$).

A series prepared from o-nitrotoluene, mono-nitrobenzene and an equal mixture of the two, each to cover a working range of 5° C will be satisfactory for average temperatures. The refractive index of each liquid should be determined for each filter it is to be used with as well as for sodium light. This should be done for two temperatures near the extremes of the range over which it is to be employed, e.g., 20°-35° C, and

calculated for other temperatures from the thermal expansion coefficients of the liquid. This may be done with the ordinary Abbe refractometer, by obtaining from the maker a correction chart for use in determining refractive indices with other than daylight, or the indices may be less satisfactorily approximated by calculation from the dispersion charts supplied with the instruments.

A fairly powerful light source is necessary. A 108-watt ribbon filament lamp is very suitable.

Procedure

A. USING a two color transmission filter:

Where particles of a fairly large size are to be examined (about 20 microns and larger), both refractive index limits of a suitable interval may be checked simultaneously. From the series of liquids that having the nearest N_D to quartz at room temperature is chosen. A small amount of the material to be examined is suspended in the chosen liquid, a suitable quantity of the suspension placed on an ordinary slide and covered with a cover slip, or the regulation counting cell is filled with the suspension. The microscope is illuminated with light passing through the selected filter and set slightly above or below focus, and those particles are counted as quartz which divide the two color bands at their boundaries; such particles will appear of one color surrounded by a halo of the other color. Size determination or estimation of each particle in the field may be made at the same time. On particles of smaller sizes it becomes increasingly difficult to follow the color changes and distinguish clearly those separating the colors from those sharply dividing them but refracting both in the same direction. Examples of filters that may be used are Wratten No. 35 D or No. 36 methyl-violet B.B.R. These transmit in blue and red and give a background against which there is some difficulty in following the separated colors. Filters transmitting complementary colors offer the decided advantage of light background. For red and green transmission we prepared satisfactory filters by removing the silver emulsion from photographic plates and combining one of the plates dyed with a 1% water solution of "Fast Acid Green B" with one dyed with a 3% water solution of "Tartrazine" (national dyes). Such a filter properly prepared should illuminate a microscopic field with a yellow-gray background against which the refracted complementary colors appear in good contrast.

B. Alternate procedure using filters transmitting in single bands:

This method, while not so rapid as that described above, is much more flexible. A wider selection of filters is available, these being obtainable with narrow transmission bands at almost any desired wave length. Satisfactory examples are Wratten No. 70 red, No. 74 green, No. 75 blue-green, and No. 50 blue.

In carrying out a determination, an immersion liquid may be chosen so that the refractive index of quartz falls within a certain interval as given by two selected filters in which case the particles appear light when examined in a field of one color and dark in the other when slightly removed from focus, or a liquid may be so chosen that its refractive index closely matches that of the quartz in the transmission band of one of the filters. In the latter case it disappears or becomes very indistinct when the field is illuminated by light passing that filter. Another filter is used in conjunction with the matching color to alter the refractive index sufficiently to render the particles distinctly visible. A simple arrangement for employing two filters is to obtain the unmounted variety and place the two selected colors in juxtaposition in a single mount, the dividing line of which may be projected into the microscopic field, so that one half of the field is illuminated by each color. Every particle counted can then be viewed in each half of the field by slight movement of the mechanical stage. Size approximations or determinations are made for each particle as its classification as quartz or not quartz is checked.

Limitations

THE above procedures are limited by the same characteristics common to other methods employing refractive index for classification of particles.

In addition there is the added disadvantage of examining the material under varying lighting conditions.

Advantages to be gained are the possibility of making size determinations on the particular particles classified, and the speed with which classification may be made.

References:

1. ROSS, H. L., and SEHL, F. W.: Determination of free silica. *J. Ind. Eng. Chem., Anal., Ed.* 1, 30 (1935).
2. POSNJAH, E., and MERWIN, H. E.: The system ferric oxide, sulphur trioxide, water. *J. Am. Chem. Soc.*, 44, 1940 (1922).
3. EMMONS, R. C.: The double dispersion method of mineral determination. *Am. Min.*, 13, 504 (1928).
4. EMMONS, R. C.: The double variation method of refractive index determination. *Ibid*, 14, 414 (1929).

Dermatitis Control

—In a Mass Production Industry—

THOMAS F. MOONEY,
Industrial Hygiene Laboratories,
Ford Motor Company,
Detroit, Michigan

SOME of the most important factors discussed briefly in this paper on the control of industrial dermatitis are:

1. The encouragement of—and the necessity for—personal cleanliness of the worker, especially the skin.
2. The elimination of irritant material from contact with the worker as far as is possible by engineering control.
3. The use of protective clothing properly cleaned, serviced, and disinfected.
4. The application of protective hand creams by the employee before beginning work on exposures likely to cause skin irritation.

According to medical authorities, "dermatitis" is an inflammatory condition of the skin due to a contact agent — sometimes referred to as dermatitis venenata. It is this type of skin irritation which is of chief interest to the industrial hygienist. The extent to which the skin will react to an outside irritant depends both on the strength of the causative agent and the susceptibility of the individual.[1]

Important Factors in the Control of Dermatitis

PERSONAL cleanliness of the worker.

This is a very important item in dermatitis control and should claim a prominent place in any effective effort to lessen the incidence of skin trouble. Personal hygiene, such as bathing and washing, the frequent laundering of clothes, and other measures which help keep the body clean together with healthy habits, are first line defenses against skin infection.

Today, more than ever before, the employee looks to his employer for those facilities which he feels are necessary for his well-being — and proper washroom

Presented at the Annual Meeting of the AMERICAN INDUSTRIAL HYGIENE ASSOCIATION, Pittsburgh, May 9, 1941.

facilities are considered indispensable by the average worker.

In a typical modern washroom, such as ours, the workers have clean wash-fountain facilities, including hot and cold water, a non-irritating soap, and clean towels. Showers are provided, together with lockers, soap and towel service. Between the lockers and showers, in a narrow passageway, solution may drain out.

Our rubber gloves are tested with air pressure under water for leaks, and if found defective, they are repaired before the process of disinfection.

In disinfecting rubber gloves, they are pulled over a rack, which holds the fingers distended. While held on this fixture, they are washed with water, then immersed in the disinfecting bath, rinsed, and dried. Such a procedure, especially with respect to rubber gloves, will have a gratifying effect on the lowered incidence of skin trouble from this common source. All new gloves should be washed and disinfected before being used by the workmen.

Our experience indicates that in new rubber gloves, there are irritants which may cause marked skin irritation. These irritants may be residual chemicals left after the gloves are processed or vulcanized, or perhaps the trouble is caused by some of the dusting powders used in packing the gloves, such as talc, mica, etc.

Many cases of dermatitis which are classified as rubber-glove dermatitis, if traced, will be found to be caused by the worker who is trying to do the job without gloves when he has been told and knows that he should use gloves, but who, for some reason, fails to get them until his hands begin to burn and sting or give him discomfort. As the adage runs, "He then proceeds to lock the barn after the horse has been stolen," gets a pair of rubber gloves and goes on with his job. Presently, he presents himself at the medical department with his hands covered with blisters. The report shows dermatitis caused by rubber gloves. Actually the man got the irritant on his hands and then put on the rubber gloves. Such a procedure, of course, invites trouble.

If this worker had taken the precaution to clean his hands and applied a small amount of protective cream and had used clean disinfected gloves preventing, during the work period, the ingress of any irritant inside of his glove, the likelihood is that there would have been one less case of dermatitis, and medical treatment from one to several weeks would have been unnecessary.

The second method of disinfection is a soap solution to which a suitable coal tar or other disinfectant, such as Wescol* or Cresylone,** has been added. This is for oil-treated raincoats, oiled hats, as well as certain other fabrics which can best be cleaned first in water, then immersed in the disinfectant solution, rinsed in water, and dried.

A third factor in the control of dermatitis is engineering.

Of many methods that can be used to provide maximum protection under this heading, one will be mentioned briefly: Elimination of irritant material from contact with the worker by enclosing or partially enclosing the operation so that solutions, fumes, vapors, or dusts do not come in contact with the worker.

A fourth and last factor in the control of dermatitis is the application of protective skin creams.

These products are intended for application to the hands and other skin surfaces before exposure to excessive dirt, grime, and grease, which are difficult to remove from the skin, or to industrial poisons likely to cause dermatitis. Such creams leave a film behind, which, when properly applied, should be dry and not greasy or tacky to touch. Thus this film acts as a barrier to harmful substances likely to irritate the skin. Greases, paints, and pigments are removed along with the cream by easy washing in ordinary soap and water.

Some of the requirements for a cream of this type are: (1) That it forms a uniform, invisible film on the skin surface and interposes a barrier against the penetration of outside materials; (2) that it can be easily removed with soap and water; (3) that it is not irritating of itself; and (4) that it is capable of emulsifying outside greases mixed with it to permit their easy removal. Creams of this kind are made just as are the usual cosmetic creams. Several standard types and some special ones are usually necessary in the average industrial plant.

IN THE use of protective creams in wet automobile body sanding, the body is rubbed with sandpaper while wet, considerable amounts of fresh water being used. As the worker's hands and forearms are exposed to water during his entire work period, the skin has a tendency on some of these men to show a marked reaction to the combination of abrasive from the sandpaper, chemical action from some of the ingredients of the paint undercoat, and other components which the worker contacts. Such work as this, if not properly controlled, may cause considerable skin reaction, especially in hot weather.

Our company has made provision to protect men on exposures such as this, by supplying them with a protective cream to mitigate the exposure. To offer protection in the case of wet sanding operations, the protective cream must have water shedding properties. It should leave a film on the skin which is water insoluble. It could contain some bland oils and waxes compounded to make a suitable "protective barrier." With this mixture an antiseptic is incorporated to aid in preventing infection should the skin become abraded or broken from contact with the abrasive. A small amount of non-irritating oil-soluble perfume is added to mask the odor of the oils. Lastly, the cream should be of such a nature that it may be washed off at the end of the work period with warm water and soap. Most of our men on wet sanding operations are now supplied with this protective cream and are encouraged to use it.

Recently we had occasion to check the effectiveness of the protection offered by this cream. Among a group of about 15 wet sanders working on the hood job, seven or eight showed considerable irritation of the skin on the wrists and forearms. These men had not as yet been provided with a protective cream. Among a second but much larger group of wet body sanders, only one case of dermatitis developed. This latter group were using a protective cream, and, so far as we could determine, both of these exposures were of a like character.

Another specific instance in the value of protective creams is shown where large quantities of kerosene are used in our carburetor assembly and test department. This oil caused considerable skin irritation among the workers whose hands and arms were in contact with it. Three to five cases weekly were common. Many could not work in the oil at all. Three years ago these men were provided with a special protective cream. I recently talked with the foreman of this department who told me that they now do not average one case of dermatitis a month from the kerosene. This is a particularly good showing and is even more convincing

*West Disinfecting Company. **Parke-Davis.

when it is known that the workers are changed every six weeks, the job being part of a rotating course given to student employees in the plant.

There are, of course, many related subjects which could profitably be discussed in a paper of this type, such as the effects on the skin of washroom soap; of cutting compounds; of the action of oils; as well as the action of many solvents on the skin—but time forbids their inclusion. It can be said that the control measures discussed here, coupled with this company's established policy of good housekeeping and general plant cleanliness, have lowered our dermatitis cases to less than 1½ cases per 1,000 men a month.

IN SUMMARY: As uncleanliness of the skin is the chief predisposing cause of industrial dermatitis, the employer should provide adequate facilities for the care of his employees' personal hygiene while at work. This will include sanitary washrooms equipped with hot and cold running water, a non-irritating soap, towels, and under certain conditions, bath showers.

Another prominent measure is the elimination of irritant materials from contact with the worker by enclosing or partially enclosing the operation so that solutions, fumes, vapors, or dusts are prevented from reaching the worker.

An important factor in the *prevention* of skin infection is the use of protective clothing, provided this type of equipment is kept in good repair, is cleaned and disinfected periodically after return to stock when used by a worker before being reissued to another employee. Two types of disinfecting solutions are mentioned—a weak solution of hypochlorite for rubber articles, and for more delicate fabrics, a soap solution containing a coal tar or other disinfectant.

The last important control measure is the use of protective skin creams. These creams form a "protective barrier film" between the skin and industrial poisons or dirt and grime likely to cause the dermatitis. These products should be non-irritating, and should, generally speaking, be insoluble or nearly so in the medium against which they are to protect. They should be easily removed at the end of the work period with soap and warm water. At least two or three standard types are necessary. Occasionally a particular exposure will require a special formulation.

The control measures discussed here, together with the company's continued good housekeeping policy, has lowered the incidence of dermatitis in our Rouge plant to less than 1½ cases for each 1,000 of plant population per month.

References

1. LEVIN, O. L., and BEHRMAN, H. T.: Occupational Dermatitis. *Indust. Med.*, 8:6, 217-229 (1939).

The Occupational Disease Hazard

—Evaluation in the Field—

WARREN A. COOK,

Director, Division of Industrial Hygiene and Engineering Research, Zurich General Accident & Liability Insurance Company, Ltd., Chicago

MORE extensive and reliable information is constantly becoming available concerning the amounts of industrial materials which cause injury to health and those which may be considered innocuous. In order to apply this knowledge on the toxic limits of these materials, it is necessary to have means of determining whether or not the exposure is within these limits.

The evaluation of the occupational disease hazard as we encounter it in the field is of vital importance in the economic control of a potentially injurious exposure. The two principal methods of evaluating the severity of the health hazard are through observation of the occupational environment and through examination of the worker.

Use and Limitations of Eyes and Nose

SO MUCH emphasis has been placed on chemical and physical testing of the air for contaminants that the question has been raised: Are our eyes and noses of no assistance to us in the evaluation of hazardous operations? Can only the chemist with his thermal decomposition apparatus, backed by a laboratory full of beakers, volumetric flasks and spectrophotometers, state whether there is too much trichlorethylene in the worker's breathing zone? Or must a man be armed with an interferometer or a tri-per analyzer if he is to avoid a chemical procedure for obtaining this information?

The answer is that it is necessary to utilize physical and chemical methods in many situations in order to evaluate the hazard if we wish to avoid the dangerous procedure of waiting to see if the worker's health is actually being affected. But before discussing the application of these methods, let me point out certain conditions where the eyes and nose are of use in arriving at an opinion of the hazard—and also some of the precautions which should be observed if the eyes and nose are to be employed as guides. In such sensory diagnosis of a condition, one must be on guard not only against optical illusions, but against olfactory illusions as well.

Let us make a survey of a manufacturing plant without benefit of the truck-load of gadgets which are the bane of the industrial hygienist's ambulatory excursions and find out what we can do and how far we can go in the evaluation of the health hazard.

The plant we visit includes a convenient variety of operations—but in this respect it is not different from numbers of actual plants on which many of us call or where we carry on our work. As we step from the office into one end of the factory, we find ourselves in a department where electrical receptacles are being produced of asbestos compounded with a synthetic resin. The first operation involves emptying bags of short asbestos fiber into mixers. No imagination was wasted on this operation; it is accomplished simply by weighing the burlap bag and dumping it manually into the mixer—following with a conscientious shaking of the bag to make sure it is entirely emptied. This operation is intermittent, but while it is being done there is a cloud of asbestos in the air which even the most casual observation would not miss.

The evaluation of the severity of this dust exposure requires one additional element which is often overlooked, the duration of the exposure. If a batch can be made up in 20 minutes which will provide enough material for the whole day, then it is probable that a respirator approved by the U. S. Bureau of Mines for Type A dusts would suffice. But if the operation is repeated every hour, general observation could be considered sufficient grounds to evaluate the hazard as excessive and to serve as the basis of a recommendation for control.

In the adjoining room, we find the batch being fed into molding machines and the receptacles being placed on racks. The plant superintendent is well satisfied with the effectiveness of the exhaust ventilation system installed when this new operation was begun a year ago, and he expects our approbation of

the installation. It is easy to say, "Yes, that is a splendid exhaust system." But what if such an offhand comment closes the subject and six years later one or two of the dozen girls on the operation develop asbestosis? If the condition does look good, what criteria can be used as guides?

Criteria for Evaluation of Dust Hazards

IN THE first place, too quick snap-judgments should be guarded against. If an unjustified OK is given, the health of the worker may be jeopardized; if a condemnation, then money may be spent unnecessarily, to say nothing of developing a lack of confidence of management in your judgment.

In the case of the asbestos dust condition, our evaluation of the exposure should be based on the knowledge that the present toxic limit for asbestos is five million particles of dust per cubic foot of air. This is a very small concentration, so small in fact that the condition may look good even to a critical eye and still present an exposure greater than this low limit. Some indication of the amount of dust present in the air may be obtained by noting the layer of dust on nearby settling places after learning how long a time has elapsed since they were last cleaned. If only a thin layer of dust has accumulated over six months or a year and there are no visible puffs of dust escaping from the operation, it is probable that the condition is satisfactory.

In the case of asbestos dust, however, and this holds with even more certainty for dusts high in free silica content, the toxic limit is so low that the only safe procedure is to have recourse to actual dust determinations. This is especially important where the injurious condition is not immediately evident but requires years to develop as in the case of asbestosis and silicosis.

What rules can be laid down in the evaluation of dust hazards in the field? Although individual conditions call for specialized treatment, a number of general suggestions can be made.

1. Obtain some reliable indication of the free silica content of the dust. A few specific items can be mentioned. In foundries, parting compounds may be largely tripoli which is free silica or they may contain less than 5% free silica. Manufacturers' statements to the latter effect can usually be depended upon. The Compensation Inspection Rating Board of New York maintains a list of parting compounds containing less than 5% free silica for which credit is allowed in the compensation rate. Dust collected in arresters connected to sandblast rooms has been used as a parting compound in some small foundries. This of course is high in free silica.

In the rubber industry, much dust is frequently present from the use of soapstone powder or talc in preventing unvulcanized rubber sheets from sticking together. Where true soapstone or talc is used, the free silica content is low, usually negligible. Imported stocks of these materials are now disappearing from the market and ground minerals obtained in this country are being substituted. Quantities of pyrophyllite, itself a combined silicate, are being utilized as a satisfactory substitute; but this pyrophyllite may include large proportions of quartz—21 and 22%. The evaluation of the potential hazard might thus be changed from negative to severe on the basis of the free silica content of the "soapstone."

2. A second important factor in the evaluation of a dust hazard, and in fact of most of the occupational disease hazards, is the duration of the exposure. In these days of accelerated production and longer work days and work weeks, this matter of duration assumes increased importance. A year ago a man may have been exposed to silica flour two hours a week in the preparation of a paint for some one customer. An evaluation of the hazard at that time may have shown it to be negligible. Today, that customer's order may have increased so that all day long several men are weighing up batches of silica flour as the inert material for this same paint. From the point of view of the paint formula, the silica flour is part of the "inerts"; but from the industrial hygiene point of view it falls within the category of silicosis-producing dusts known as proliferative materials. And if a proliferative dust is present throughout the entire workday and week, it should be given careful attention in order to ascertain definitely whether or not health is being affected.

3. As an aid in learning which dusts may cause injury and which are relatively safe, research has been conducted on the action of various dusts on injection into guinea pigs. The interperitoneal reaction is a measure of the effect of these dusts on being inhaled into the lungs. Publications[1] on the results of these tests may be obtained from the Division of Industrial Hygiene, National Institute of Health, Bethesda, Maryland, and it is probable that information on the reaction of certain dusts not included in these publications could also be obtained on inquiry. The dusts are divided into three groups: (1) absorptive, such as calcium carbonate or marble dust; (2) inert, such as aluminum oxide or emery dust, and (3) proliferative, such as silica flour and tripoli. Dusts in proliferative group are those which produce silicosis on sufficient exposure.

4. If general observation does not indicate an obviously dusty condition where the free silica percentage of the dust is appreciable — in which case control measures should be immediately instituted — dust determinations should be made, unless they are obviously negligible.

Without going into a very extensive discussion of the methods of determining the concentration of the various industrial contaminants in workroom atmospheres, the standard method of dust determination in this country is the impinger.[2] This device, originated by Leonard Greenburg, has since been made more portable and is commercially available as the so-called "midget impinger" through the Mine Safety Appliances Company.[3] Other devices such as the konimeter and the Bausch and Lomb dust counter collect grab samples and are useful control instruments.[4]

Exposures to Toxic Dusts and Fumes

OUR plant survey continues and we proceed to an adjoining department where a litharge-glycerine cement is being used for attaching glass lenses to polished metal reflectors. A group of girls are working around a large table, each being provided with a one-pound carton of litharge. The housekeeping is scrupulously clean. All hygienic measures such as adequate washing facilities are provided and their use rigidly adhered to. The operation involves removal of litharge by means of a spatula from the carton onto a glass plate where a small amount is mixed with glycerine prior to being applied to the end of the glass lens. There is every appearance that conditions are satisfactory. But where workers are handling toxic materials such as lead in a powdered form, it is dangerous to take for granted that exposures are within safe limits on the basis of appearances alone. Even though lead oxide is heavy and tends to settle more rapidly than dusts having lower specific gravities, very finely

divided material will remain suspended owing to air movements in a room.

It happens that general observation of just such an operation resulted in the opinion that conditions were safe. No determinations of lead in urine, of basophilic content of the blood, or of lead in air were made. Six weeks after this operation was started two of the girls developed lead poisoning, one sufficiently severe to cause a brief period of hospitalization. Any one of the three methods of determining whether the exposure was excessive would have led to institution of preventive measures.

In a separate building in the yard of our hypothetical plant, a purification process is being conducted on lead sheathing which is used over and over again in connection with vulcanization of rubber insulated cable. Here tons of lead are being handled. Where the small amount of litharge in the previous department may have caused us to treat the hazard very lightly, the presence of large quantities of lead tends to result in more careful consideration. After being melted in a cupola, the lead is run into large shallow pots where the impurities were removed by fluxing. Large volumes of air are removed from the area over these 12-foot diameter pots, and, in this department also, personal hygiene is of the best. In view of the magnitude of the operation, air samples are collected for lead determination and our results show that general atmosphere throughout this building contains lead dust and fume in amounts well within safe limits.

In making any evaluation of an occupational disease hazard, it is of much importance to note carefully whether certain operations may be carried on for comparatively brief periods from time to time which may result in sufficiently excessive exposures to raise the daily and weekly absorption of such material to dangerous limits. Before concluding the collection of our air samples in this lead purifying building, samples were taken to show the exposure of the man during the fluxing operation and also while the pots were being skimmed. The exhaust ventilation removed the dust and fume properly during the fluxing, but the worker who skimmed the pot placed the wheelbarrow directly behind him and as he deposited the dross into the wheelbarrow a cloud of dust was drawn directly past his breathing level by the powerful exhaust fan over the pots. During this skimming operation it was found that there was high lead intake by this worker even though the operation was of comparatively short duration. The control measure was readily apparent once this one exposure was evaluated as being severe.

Where operations introduce comparatively high exposures intermittently and with some degree of irregularity, a type of test which permits summation of these intermittent exposures is particularly valuable. If air tests can be carried on over a long time to show truly representative results, these are helpful, but the best test in such a case is the analysis of urine for lead.[5]

With the development of rapid techniques such as the dithizone and dropping mercury electrode methods, results of urinalysis for lead are becoming more readily available as a means of evaluating the hazard, since the amount of lead excreted in the urine is an excellent measure of the total lead intake throughout the work-day.

Where the worker may be protected by means of a filter-type respirator approved for lead dust or lead fume, the worker's lips and nostrils should be closely observed as an indication of the effectiveness of this measure and of the conscientiousness of the worker in fitting the respirator properly to his face, keeping the head bands under proper tension, and holding the respirator on his face while he is being exposed to lead, even when supervisors are not in the immediate vicinity. The filter-type respirator may not be providing adequate protection even under ideal conditions, and determination of lead in urine may well be conducted as a means of verifying the general impression that the worker is being properly protected.

Exposure to Organic Solvent Vapor

ON RETURNING to the main part of the plant, we find that an insulating compound is being used to impregnate the abestos covering woven over copper cable. The bitumen used as the impregnating material is dissolved in a solvent mixture. Some years before, toluol had replaced benzol as a thinner for this material and the amount of solvent vapor getting into the work-room atmosphere was within safe limits. At the present time it should not be taken for granted that such an operation remains within safe limits, but specific inquiry should be made as to whether benzol is again being used since most of the toluol is going into the manufacture of TNT. If benzol is once more being introduced into this operation, it is still possible to keep the exposures within safe limits but it is not considered good industrial hygiene to depend upon the intensity of the odor as an indication of the concentration of benzol vapor present. The concentration of benzol can be determined by a number of methods; by air analysis using chemical methods or by such physical methods as the heat of combustion method using a device known as the benzol indicator, by the interferometer or by adsorption on such solid adsorbents as silica gel or activated charcoal.

As was the case in connection with lead exposures, an integrating method can be employed as a measure of the extent of exposure to benzol over the previous few days. This test involves the analysis of urine for inorganic and total sulphates,[6] an easily conducted test which can be made in chemical laboratories of most plants without involving special equipment. Analyses of the air are of value,[9, 10] particularly in locating those areas and operations where benzol exposures are the greatest. But for the evaluation of the hazard, the urine sulphate test gives us our best information short of blood tests which do not show a positive indication until after some damage has been done.

We have mentioned that the odor of the benzol should not be depended upon in determining whether or not exposures are excessive. One of the reasons for this is that the toxic limit of benzol is comparatively low—100 parts per million being the maximum concentration to which workers should be exposed over any period of time, and, secondly, benzol is not one of the more odoriferous solvents.

Where we are dealing with some of the lesser toxic solvents many of which fortunately have more distinct odors, then the sense of smell will serve to a certain extent as an indication of the hazard. As pointed out by Patty in a publication on rapid methods for the determination of gases in the air,[7] the most universally available rapid method of detecting and estimating gaseous contamination is by odor. He cautions, however, that individual sensitivity to odors varies considerably and fatigue occurs rapidly. Consequently every opportunity should be taken for the correlation of one's individual sensitivity to odors with the concentration of the materials causing such odors usually expressed in terms of parts per million.

After one finds that he associates a strong odor of some such solvent as isoamyl acetate with a concen-

tration of one-quarter the usually accepted toxic limits, he should keep in mind that it is the initial inhalation of such an atmosphere which should be used as an indication. If we walk slowly toward a process presenting an organic solvent vapor exposure, our noses become progressively fatigued as we approach the higher vapor concentrations closer to the operation. Consequently we may have little appreciation that there is a strong odor of the vapor even though the exposure may be within injurious limits. If odor is to be used as a criterion, a good technique to follow is to wear a respirator provided with activated charcoal cartridges. Only when the observer is at the operation itself should the respirator be removed. The opinion concerning the intensity of the odor should be predicated on the first few inhalations. Since one's sense of smell may be less intense at certain times than at others, it is a much safer procedure to use the nose to decide that the condition is dangerous where control measures can be easily taken rather than to depend upon the nose as the last word in deciding that a condition is satisfactory. It must be admitted that although the canine nose may identify a smell with certainty, the human olfactory end-organ is more convenient than reliable.

Reliability even of precise chemical methods should not be accepted blindly. It is always well to test the tester. A thoroughgoing example of checking a newly developed method is that described by Barnes and Speicher in the determination of formaldehyde in air.[8] Using an impinger with distilled water as the collecting medium, only about 50% of the formaldehyde was retained in a five-minute sample, but 93% of the formaldehyde in the air of a test chamber was consistently collected when 1.25% potassium hydroxide was used as the collecting medium.

Some of the Newer Health Hazards

OF THE newer exposures to occupational disease hazards incident to the present emergency, a mercury poisoning hazard was evaluated by Goldwater and Jeffers[11] as being excessive through observation of clinical symptoms and an interesting action pointing to the source of the exposure. A new anti-fouling paint was being used in the New York Navy Yards which had to be heated prior to its application. The men who were spraying the heated paint, or who were in the vicinity of the fumes being given off from it, noticed that any gold rings which they were wearing developed a silvery coating, obviously from the formation of a mercury amalgam. In addition to this, a silvery deposit was formed on the ship's hull in the area where fumes from the heated material made contact with it. With symptoms of mercury poisoning showing the need for control measures and the presence of this amalgam showing the source of exposure, control measures were soon instituted.

Today we are hearing much about the greatly expanding synthetic rubber industry. Acrylonitrile or vinyl cyanide is one of the initial materials for producing one or more of the "Buna" rubbers. Since the substance contains the poisonous cyanide radical, it was believed desirable to institute a study of the toxicology of this material to provide information on which to evaluate the extent of the hazard. By ascertaining the toxicity of this material, which was found to cause death of dogs on exposure to concentrations of only 110 parts per million after as little as four hours, these investigations[12] permit the proper evaluation of the hazard so that adequate precautions can be taken and industrial exposures kept within safe limits. Such means of evaluating the hazard before rather than after symptoms have developed is in line with enlightened industrial hygiene methods.

During the last war, considerable numbers of cases of poisoning from trinitrotoluene were experienced. There is much activity in this country today to avoid recurrence of such cases in our own TNT plants, but cases are already being reported from abroad. In one foreign country, a recent report gave seven cases of TNT jaundice with two deaths and, in another, a group of 13 workers had to be hospitalized as a result of TNT exposure, four of whom died. In the more effective control of dust and vapor in TNT production and loading plants in this country, improved methods of determining the concentration of this material in air have been developed. A colorimetric method has been devised by Pinto and Fahy, of the Massachusetts Division of Occupational Hygiene.[13] In shell filling operations the nose and the eyes do not provide sufficient indication of excessive TNT exposure. Actual chemical analyses of the air are necessary.

In conclusion it may be stated that in the evaluation of occupational disease hazards in the field, much can be done in spotting conditions which are obviously severe on mere observation of the condition. Where the condition presents some question as to the severity of the exposure, then specialized methods should be utilized as a measure of the degree of the hazard. As we have indicated, these determinations can be made through air analyses or through certain determinations on the urine or blood of the worker. The purpose of the evaluation of the hazard is that conditions presenting excessive exposures can be disclosed before actual injury to health occurs. After control measures have been instituted, then these checks should again be made so that it can be known definitely that they are effective.

Where it is found necessary to institute air analyses or similar technical measurements, the Divisions of Industrial Hygiene of most of the industrial states are available to manufacturers for study of their conditions. A number of the leading insurance companies also have such facilities available for concerns which they insure for compensation, and certain companies extend this service where group life or group disability coverages are in force. Some of the universities provide consultation service. Private consultants are also available. Frequently, an initial complete survey of a condition by some one of these specialized services can be followed up by inspection or by routine analyses conducted by the plant engineer or chemist. Recording instruments have been developed for such materials as carbon monoxide, sulfur dioxide, carbon disulfide and hydrogen sulfide, but the initial cost of these tend to be rather high.

Judgment and experience count for much in the evaluation of the occupational disease hazard, but where there is any question as to the need for introducing control measures, or where such control measures run into any appreciable cost or inconvenience, then this evaluation can best be based upon such specific data as is to be provided by determinations appropriate to the exposure.

References:

1. MILLER, J. W., and SAYERS, R. R.: The response of peritoneal tissue to industrial dusts. *Pub. Health Repts.*, 56, 264-72, (1941).
2. GREENBURG, L., and BLOOMFIELD, J. J.: The impinger dust sampling apparatus. *Pub. Health Repts.*, 47, 654-75, (1932).
3. LITTLEFIELD, J. B., and SCHRENK, H. H.: Dust sampling with the Bureau of Mines midget impinger, using a new hand-operated pump. *Bur. of Mines R. I.* 3387 (1938).
4. BLOOMFIELD, J. J., and DALLAVALLE, J. M.: The determination and control of industrial dust. *Pub. Health Bull.* 217, 1-167, (1935).

5. BARNES, E. C.: Possibilities of control of lead exposure by examining less than 24-hour urine samples. *J. Indust. Hyg. & Tox.*, 21, 464-68, (1939).
6. YANT, W. P., SCHRENK, H. H., SAYERS, R. R., HORVATH, A. A., and REINHART, W. H.: Urine Sulfate determinations as a measure of benzene exposure. *J. Indust. Hyg. & Tox.*, 18, 69-88, (1936).
7. PATTY, F. A.: Rapid methods for the determination of gases in the air. *A.J.P.H.*, 30, 1191-98, (1940).
8. BARNES, E. C., and SPEICHER, H. W.: The determination of formaldehyde in air. *J. Indust. Hyg. & Tox.*, 24, 10-17, (1942).
9. DRINKER, P.: Vapors and their routine measurement. *A.J.P.H.*, 30, 1063-67, (1940).
10. Routine sampling for control of atmospheric impurities. Preventive Engineering Series, Bulletin No. 2, Part 8, Industrial Hygiene Foundation of America, Pittsburgh, (1939).
11. GOLDWATER, L. J., and JEFFERS, C. P.: Mercury poisoning from the use of anti-fouling plastic paint. *J. Indust. Hyg. & Tox.*, 24, 21-23 (1942).
12. DUDLEY, H. C., and NEAL, P. A.: Toxicology of acrylonitrile (vinyl cyanide). I. A study of the acute toxicity. *Ibid.*, 24, 27-36 (1942).
13. PINTO, S. S., and FAHY, J. P.: A new colorimetric method for the determination of TNT (2, 4, 6, trinitrotoluene) in air. *Ibid.*, 24, 24-26 (1942).

Plant Hygiene Studies

THE location, identification and control of unhealthful occupational exposures is a primary function of the industrial physician. Technically, an exposure is defined as any working condition or environment, process, operation or material used in manufacturing which is capable of causing harmful physical effects. These may, on occasion, be so obvious that workers themselves are perfectly familiar with their source. Most frequently periodic physical examination of employees will prove to be the most sensitive index of the effect on workmen of industrial exposure and inadequacy of control measures. Elsewhere, discovery requires diligent combined effort by highly trained medical and engineering personnel. In any case, systematic methods are essential in order that dependable data may be secured on which a program of adequate control can be based Plant hygiene studies have proved to be reliable and to require least expenditure in time and money. The procedure is essentially one of taking periodic inventory of unsatisfactory occupational risk.

Location of Exposures

EXPERIENCE in large and small industrial establishments suggests that plant hygiene studies are likely to be most successful if certain steps are followed:

1. A complete list of all materials used in manufacture should be secured. Those capable or suspected of causing trouble should be suitably indicated on the list.

2. All steps in manufacture should be described, preferably in the form of a diagram or schematic representation, to indicate the flow of goods from raw material to finished product.

3. Thorough inspection of the working premises is essential to test conclusions drawn from the inventory of materials and processes and to evaluate other conditions of work which are potential contributors to disability and lowered production. It must not be forgotten that harmless substances may under certain conditions or in susceptible individuals become harmful. In the same way, no matter how much care has been expended in preliminary investigation, additional or unsuspected sources of exposure will be missed unless every aspect of the working environment is carefully scrutinized.

4. A record should be made of every material, process or environment capable or suspected of causing injury or disease, the exact location of each, and the number of workers exposed.

Council on Industrial Health, *J.A.M.A.*, March 7, 1942.

Identification of Exposures

EXPOSURES are important by nature, extent and the degree to which they may be controlled. Most industrial hygienists believe that sufficient information exists about control methods in general to permit safe handling of all but very new or recently introduced substances in industry.

Problems of this nature likely to be encountered by the physician in industry are extremely diverse and widespread. Efforts have been made to classify them. One of the most useful outlines is the following:*

A. Abnormalities of air pressure.
B. Abnormalities of temperature and humidity.
C. Dampness.
D. Defective illumination.
E. Dust.
F. Infections.
G. Radiant energy.
H. Repeated motion, pressure, shock.
J. Poisons.

Subheadings under the major title of poisons are most numerous, and a complete list of all substances capable of causing local or systemic effects is a very considerable one. In the case of allergic manifestations arising from industrial substances, the list of potential exposures becomes almost endless.

Engineering Studies

FOLLOWING location and identification, the physician should indicate in the record his estimate of the seriousness of each exposure. If doubt exists about its exact nature or satisfactory control, assistance is needed from an industrial hygiene engineer. In fact, confirmation about the severity of most exposures is often highly desirable and it is routine practice in many manufacturing concerns for an engineer with suitable qualifications to verify all preliminary estimates. Qualitative and quantitative analyses of each exposure are available in this way for use as factual evidence if necessary. All determinations of this character should be suitably entered in the records.

Control of Exposures

AS SOON as the industrial physician has established a source of occupational disability he must set the machinery in motion for adequate control. Since the physician must in many situations recommend specific control measures or pass judgment on the effective nature of proposed or existing installations, a knowledge of the fundamentals of industrial hygiene engineering is a most useful piece of equipment for him to possess. Control procedures fall in one of the following major classifications:

1. Substitution—harmless materials are substituted for those causing trouble.
2. Alterations in processing or manufacturing.
3. Segregation of operations.
4. Capture of dusts, fumes, mists, vapors or gases at the point of origin.
5. Use of personal protective equipment.

The actual application of these general principles often requires a high degree of specialized knowledge and technical skill obtainable from properly qualified engineers and industrial hygienists.

*Taken from Bulletin 41 of the U. S. Department of Labor, "Occupation Hazards and Diagnostic Signs," by LOUIS I. DUBLIN and ROBERT J. VANE, 1941.

New Processes

ALL NEW processes, materials or modifications of old ones should be investigated in much the same way and in advance of installation to prevent the introduction of unexpected exposures.

Maintenance of Control

PLANT medical inspections are an essential phase of control maintenance and consequently of the industrial physician's routine. These inspections should occur periodically. Sites of greatest exposures need frequent attention, possibly constantly repeated chemical and engineering evaluation. Others are visited in relation to their importance. Periodic plant walks by the medical department personnel throughout the entire establishment is particularly sound practice. Occasionally, inspections should be made in company with officers of the firm, particularly those responsible for production, personnel, plant conditions and safety. Active interest and cooperation from management is quite as great an element of successful medical department administration as cooperation from the workmen. Employees most emphatically need instruction and regular supervision in order that adequate understanding may exist about the continuous and proper use of protective devices.

The record system of the medical department should contain copies of recommendations leading to the installation of control measures, the date of installation and the dates of and special notations about follow-up visits and inspections. Forms can readily be devised which will facilitate

the uniform recording of all results of plant inspection.

Medical inspection has additional advantages. It provides opportunity for thorough familiarity with every job in the plant. Information of this character is of the greatest usefulness in relating work assignments to the physical and temperamental qualifications of workmen. It is reassuring to employees to know that plant conditions are under observation by medical personnel. It is equally satisfactory to employers to realize that proper records are available in case claims arise out of alleged unhealthful conditions of work.

Application in Small Plants

THE physician serving a small plant should be guided in his approach to unhealthful exposures by these same general principles. Frequently he will need special technical assistance. Committees on industrial health are being developed in state and county medical societies in order that the practicing physician called on to serve in industry may have access to ready sources of consultation and special information. Preliminary plant hygiene studies should in many cases be arranged through qualified consultants. Obscure exposures will require aid of this same description.

Assistance can frequently be secured by application to experienced industrial physicians or industrial hygienists. Occasionally consulting services are provided by insurance companies or trade associations to member companies. A few city and county health departments have established bureaus of industrial hygiene for investigation and consultation about occupational exposures. If local resources fail, assistance may be sought through bureaus of industrial hygiene in state health or labor departments, and these in turn have the advantage of specialized information and investigating facilities supplied by the Division of Industrial Hygiene of the U. S. Public Health Service.

American Industrial Hygiene Association
News of Local Sections

Michigan Section

THE Michigan Industrial Hygiene Society had an all-day Conference on Industrial Health Conservation, Friday, March 27, 1942, at Hotel Statler, Detroit. The program gave timely discussions of conditions affecting health in present-day industry, and of methods for conservation of the health of industrial workers, as follows:

Friday Morning

PRESIDING—MR. A. O. THALACKER, Secretary, Detroit Rex Products Co., Detroit.

"A Study of the Wilson Combustion Analyzer for Chlorinated Hydrocarbons"—PAUL F. REZIN, Field Supervisor, Bureau of Industrial Hygiene, Michigan Department of Health, Lansing.

"Toxicity of Lead Chromate"—GORDON C. HARROLD, Ph.D., Industrial Hygienist, Industrial Hygiene Laboratories, Chrysler Corporation, Detroit.

"The Determination of Zinc Oxide Fume in Air"—WILLIAM G. FREDRICK, Sc.D., Chief Chemist, Bureau of Industrial Hygiene, Detroit Department of Health, Detroit.

"Visiting Nurse Service for the Small Plant"—MISS LUCILLE HARMON, R.N., Supervisor, Industrial Nursing Service, Visiting Nurse Association, Detroit.

"Industrial Safety in Michigan and its Relation to Industrial Hygiene"—JOHN W. GIBSON, Chairman, Commissioner of Labor and Industry, Lansing.

Friday Afternoon

PRESIDING—KENNETH E. MARKUSON, M.D., Director, Bureau of Industrial Hygiene, Michigan Department of Health, Lansing.

"The Physiologic Action of Light Metals"—STEWART F. MEEK, M.D., Assistant Medical Director, Chrysler Corporation, Detroit.

"White Fingers"—WILLIAM T. KREBS, M.D., Medical Director, Hudson Motor Car Company, Detroit.

"Industrial Health Activity in Michigan"—J. DUANE MILLER, M.D., Chairman, Committee on Industrial Health, Michigan State Medical Society, Grand Rapids.

"Some Special Problems in Our War-Time Industrial Health Program"—C. O. SAPPINGTON, M.D., Dr. P.H., Industrial Consultant, Chicago.

"Fatigue in Industry"—ROBERT H. FLINN, M.D., Past Assistant Surgeon, Division of Industrial Hygiene, National Institute of Health, Bethesda, Maryland.

"Experience with Some Common Industrial Solvents"—JAMES H. STERNER, M.D., Laboratory of Industrial Medicine, Eastman Kodak Company, Rochester, New York.

Friday Evening

PRESIDING—CLARENCE D. SELBY, M.D., Medical Consultant, General Motors Corporation, Detroit, Michigan.

"Training of Industrial Personnel in Michigan"—HENRY F. VAUGHAN, Dr. P.H., Dean, School of Public Health, University of Michigan, Ann Arbor.

"Fluorographic Surveys with a Discussion of Relative Merits of Various Size Fluorographs"—BRUCE H. DOUGLAS, M.D., Commissioner, and C. C. BIRKELO, M.D., Roentgenologist, Department of Health, Detroit.

On January 14, 1942, at Lansing, Michigan, the following subjects were discussed:

"Safety at Work"—C. M. EMERSON, Personnel Manager, Wolverine Brass Works, Grand Rapids.

"Interesting the Private Physician in Industrial Health"—J. DUANE MILLER, M.D., Chairman, Committee on Industrial Health, Michigan State Medical Society, Grand Rapids.

"Syphilis in Industry"—F. J. WEBER, Past Assistant Surgeon, United States Public Health Service, Washington, D. C. (With sound film.)

On February 18, 1942, DR. LOUIS SCHWARTZ, Director, Office of Dermatoses Investigations, National Institute of Health, Bethesda, Maryland, discussed "Industrial Dermatitis in Defense Industries." DR. SCHWARTZ covered the control as well as the cause and incidence of occupational dermatoses.

Metropolitan New York Section

THE Metropolitan New York Section heard MR. GEORGE E. FERGUSON, of the Pyrene Manufacturing Company, present a talk on "Fire Gases" at the meeting held January 21, 1942. Of special interest was the variety of mixed fire gases, together with the relative quantities of each which might be expected from the combustion of certain classes of substances. Results of work were presented where combustion was carried on in atmospheres varying in oxygen content from an appreciable excess to the point where production of gases was essentially from destructive distillation rather than actual oxidation. MR. FERGUSON stressed the possibility of combined effects of noxious gases in atmospheres containing various combinations of them.

February 25, 1942, DR. ADELAIDE ROSS SMITH, Division of Industrial Hygiene, New York State Department of Labor, addressed this group on the effects of industrial dust on the lungs.

Chicago Section

THE Chicago Section presented the subject of "Organic Solvent Vapor Exposures" at a meeting on January 8, 1942. DR. MILTON H. KRONENBERG, Director, and KENNETH M. MORSE, Industrial Hygiene Engineer, Illinois Department of Public Health, Division of Industrial Hygiene, gave the results of their medical and engineering study of carbon disulfide and hydrogen sulfide exposures in the synthetic meat casing industry. DR. JAMES H. STERNER, of the Laboratory of Industrial Medicine, Eastman Kodak Company, Rochester, discussed the general subject of "Solvent Vapor Exposures" and included results of the work he has had in progress concerning the effect of some of the newer petroleum distillate solvents.

February 5, 1942, the Chicago Section heard MELVIN J. EVANS on "Constructive Human Relations." Industrial hygiene is, of course, largely concerned with technicological methods for provision of healthful working environment, but only through proper human relations can effective accomplishment be made in this or any other phase of industrial production.

Practical Application of Industrial Ventilation is the subject to be presented by JOHN M. KANE, Engineer of the American Air Filter Company, Louisville, Kentucky, at the dinner meeting on April 2. This meeting is to include discussion of individual problems and methods of their solution. Since many health hazards are to be controlled through removal by ventilation, this subject is of especial value.

The Chicago Section is sponsoring the Session on "War-Time Industrial Hygiene Problems" to be held as part of the Midwest Safety Conference, May 5-7, 1942. This session, scheduled for Wednesday afternoon, May 6, includes the following program:

"The Industrial Health of Women in War-Time Production"—MARGARET T. METTERT, Women's Bureau, U. S. Department of Labor, Washington, D. C.

New Materials and New Applications in War-Time Industry:

"Tellurium and Other Metallic Materials"—HAROLD H. STEINBERG, M.D., Assistant Medical Director, Peoples Gas, Light and Coke Company, Chicago.

"Solvents"—HENRY F. SMYTH, JR., Senior Industrial Fellow, Mellon Institute, Pittsburgh.

"Effective Industrial Hygiene under War-Time Conditions"—H. G. DYKTOR, Chief Engineer, Bureau of Industrial Hygiene, Michigan Department of Health, Lansing.

New... and Available

AO Filterweld Welding Plates

No longer do you have to wait for AO welding plates... in *any* quantity. For AO is now filling all orders for Filterweld, the newest development of the American Optical Company Research Laboratories.

Filterweld — now available in the Noviweld shades #9, #11, and #13, as well as in shades #8, #10, #14 — is a service-proved welding glass that is identical with Noviweld in ultra-violet and infra-red absorption. It is scientifically controlled in production... has fixed standards of densities... conforms with U. S. Bureau of Standards specifications.

Order Filterweld Plates for your AO Helmets today. Just get in touch with your nearest American Optical Company branch office.

American Optical Company

SOUTHBRIDGE, MASSACHUSETTS

INDUSTRIAL SAFETY EQUIPMENT ASSOCIATION

SOCIAL SCIENCES

Ciba Announces

BIOTOSE

A FORTIFIED B COMPLEX

40 CAPSULES
BIOTOSE
Ciba's Vitamin B Complex with Liver Concentrate, Vitamin C and Phytine
CIBA
For Indications and Dosages: See enclosed circular.
CIBA PHARMACEUTICAL PRODUCTS, INC.
Lafayette Park, Summit, N. J.

CONTAINED IN EACH CAPSULE OF BIOTOSE

Thiamin Hydrochloride (Vitamin B1)	0.3 mg.
Riboflavin (Vitamin B2)	0.425 mg.
Nicotinic Acid (P-P factor)	3.0 mg.
Pyridoxine (Vitamin B6)	0.1 mg.
Ascorbic Acid (Vitamin C)	12.0 mg.
Phytine	0.1 gm.
Pantothenic Acid (FF factor)	0.28 mg.
Liver Concentrate 20:1	0.5 gm.

BIOTOSE, "Ciba," presents a new balanced combination of water-soluble vitamins together with Phytine, vitamin C and liver extract. The proposed daily requirements for these vitamins as suggested recently by the Food and Nutrition Committee of the National Research Council have been used as a guide in the preparation of BIOTOSE* . . . . surely a gratifying sign in these days of haphazard vitamin combinations.

The polyphasic indications for the use of the entire B complex are numerous and many mild and oftentimes unrecognized deficiencies may be present. BIOTOSE has a general tonic effect in these cases of mild and moderate avitaminoses.

Phytine* is the calcium-magnesium salt of inositol hexaphosphoric acid and not only helps remineralize the body, but its addition to BIOTOSE makes it the only vitamin preparation containing inositol . . . . an important water-soluble component of the vitamin B complex. BIOTOSE is a strictly ethical product, available as capsules, packages of 40 and 100.

*Trade Mark Reg. U. S. Pat. Off.

LITERATURE TO THE MEDICAL PROFESSION ON REQUEST

C·I·B·A

CIBA PHARMACEUTICAL PRODUCTS, INC., SUMMIT, NEW JERSEY